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PART I.

OUR SOLDIERS' GRAVES.

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[Read February 25, 1919; Mr. A. W. SUTTON, V.M.H., in the Chair.]

Even throughout life, 'tis death that makes life live,
Gives it whatever the significance.

THE Graves Registration Commission has had many spheres of activity besides the special department with which I am more directly connected.

Its chief concerns have been the finding, marking, and registration of the graves of officers and men who die on active service.

The details of the gradual growth and building up of the Graves Registration Commission have been so well given by Lt.-Col. G. H. STOBART in the Quarterly Journal of the United Services Institution for May 1917, that it is unnecessary to deal at length with the matter here. It must never be forgotten, however, that our nation owes to the unexampled generosity of the French the possession in perpetuity of the plots of ground where British cemeteries have been established. The French passed a law at the close of 1915, by which, having assumed the necessary powers, they undertook to purchase all such plots and present the "right of enjoyment" of them as a free gift in perpetuity to the British Nation, the British Government on its part making itself responsible for their maintenance. To quote from the paper to which I have referred: "The fact of this magnificent gift, the degree of generosity which prompted it, and the spirit in which every

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suggestion put forward by the Graves Registration Commission was met by the French Government, are too little known to the general public of this country." Similar concessions have been generously granted by the Belgian and Italian Governments.

One very beneficial result of this law was that it allowed of the formation of authorized cemeteries immediately behind the line in which properly arranged burials could take place, and the practice of making isolated graves has in consequence gradually ceased.

Soon it was realized that in connexion with the work of the Commission both during and after the war, many questions would arise which could not be dealt with effectively by a branch of the Army; it was therefore decided to form a representative Committee to be called "the National Committee for the Care of Soldiers' Graves" to take over from the Army at the end of the war the completed records and general administration of the work, and H.R.H. the PRINCE OF WALES consented to become President of the Committee.

This Committee was duly recognized by the French authorities, and the self-governing Colonies and India appointed their representatives.

The whole question of the care of soldiers' graves came before the recent Imperial War Conference. As a result of the deliberations of that body the Imperial War Graves Commission was constituted by Royal Charter and now forms the permanent body to whose care the maintenance of our military cemeteries in France, Belgium, Italy, and elsewhere will be entrusted.

Though my title might suggest that I intend giving a detailed account of all the activities of the Graves Registration Commission—and a very interesting story it might make—it is within my province to refer only to that side of the work with which I have the honour to be intimately associated.

The Horticultural, together with the Architectural side of the work of the Commission, may be regarded as the final, and, we hope, the crowning portions of that work, since to the architects and horticulturists is entrusted the proper designing and planting of our cemeteries, so that they may serve as worthy and permanent memorials for all time, to those who have so gallantly laid down their lives for their countries and Empire.

It was only in the early spring of the year 1916 that it became possible to organize a definite scheme for beautifying our graves and cemeteries in France. Previous to this there had been individual efforts in some of the cemeteries at the Base on the part both of French and English to make provision for the care of the graves of our soldiers, and to these pioneers we owe a great debt of gratitude. Now with a Horticultural Department carefully organized, working in conjunction with a body of skilled and well-known architects, the planning and planting up of our cemeteries is proceeding in an orderly and regular manner. The funds for this gardening work during the war were supplied by the Joint War Committee of the British Red Cross Society and the Order of St. John.

While the war was in progress the horticultural work occupied the attention of three officers, and at the present time six officers are engaged in the work of planting and making beautiful our cemeteries in France, and one officer is similarly engaged in Italy.

In addition there is a staff of non-commissioned officers, foremen gardeners, all of whom have an expert knowledge of gardening and have held important horticultural posts at home before the outbreak of the war; and a large body of gardeners. There are also a certain number of women, who have been doing good work on a few cemeteries at the Base.

So far my remarks have related to the French and Italian fronts, but equal care is being or will be taken elsewhere; in Egypt, for example, the care of our soldiers' graves is being undertaken by the Horticultural Department of the Egyptian Ministry of Agriculture.

Horticultural work in our cemeteries in France is attended with several practical difficulties. In the first place, we are confronted with the French law which permits of only three square metres of ground being taken for each burial, and which also enacts that trees shall not be planted nearer than two metres, or hedges nearer than half a metre, to the boundary of a cemetery. Then the burials have often had to be very close together, so that there is not much space left for bold treatment; the paths also are perforce rather narrow, and only simple plans for horticultural treatment are possible.

To the French authorities, however, our sincere thanks are due for the spirit in which they have met us in our difficulties, and for the way in which they have been ready to do all they could to fall in with our requests for the adjustment of boundaries, so that it should be possible to prepare a more adequate and dignified design.

In order that the conditions under which we have to work may be better understood it is necessary to refer briefly to the two methods of burial which have been followed in our cemeteries. In some, and this is usually the case in the Base and also in many of the smaller frontal cemeteries, the burials are in separate graves and each one is made up into a large mound of earth, the cross or other symbol* being placed at the head of the grave (figs. 4, 5, 6). In other cemeteries, more especially those attached to Casualty Clearing Stations, near places where heavy fighting has taken place, burials are in trenches because there has not been sufficient time to allow of individual graves being dug. In such trench cemeteries the actual resting-place of each man is marked by the cross or other appropriate symbol, and the surface of the trench, when finished, is made up into a long smooth continuous mound or border (fig. 1).

In large cemeteries several such trenches lie parallel to one another, separated by narrow paths.

Wherever possible the graves and trenches face the east, but in

* For Jews each grave is marked by the double triangle on an upright stake—the sign of David—and Indian graves are marked by a simple stake bearing the inscription.

some cases where trench burial is the method adopted, it has been necessary to make double trenches (figs. 2, 3). Where this arrangement exists, the crosses are placed down the middle of each double trench area, back to back, leaving a space between the two rows which can (if required) be planted with a dwarf hedge of roses or flowering shrubs.

I may allude here to one trench cemetery in particular where all lie facing the east, the officers being buried to the east of their men. Thus are they still in position at the head of the great army ready to lead their men once again when the final call shall come.

Cemeteries, as may well be imagined, vary greatly in size, character, and situation. Those near important Base Hospitals have, as a rule, reached large dimensions, as have also those formed in connexion with Casualty Clearing Stations or Field Hospitals near the front, where the line remained more or less stationary for a considerable time. In other cases cemeteries may be found which it seemed probable at the time of their formation would have to accommodate a large number of burials, but which, owing to an advance, were left far behind the lines and now contain only a few graves. Such small places, the number of which is considerable, afford many difficult problems, not only in connexion with the adjustment of land claims, but also in relation to questions of design and horticultural treatment, since it is far less easy to plant adequately a small site than a large one, and there is little scope for any boldness in design.

Mention must further be made of the many French Communal cemeteries where we have been permitted to bury our men. Examples of this type will be found in many villages and towns. In some places separate plots have been assigned to us, but in others there may be only a few of our graves scattered among those of the civil population. In all such places we are limited in our efforts by the French Communal regulations, but, as a rule, thanks to the kindly sympathy and co-operation of the Mayors, we are being allowed to carry out our own ideas as to treatment, despite the fact that they are usually very markedly different from those considered appropriate for cemeteries by our French Allies.

As may well be imagined, the present condition of the different types of cemeteries to which I have referred depends very largely on their position with reference to the recent scenes of active operations. In the area of the Lines of Communication it has been possible to carry out a good deal of work of a more or less permanent character, including the planting of trees and shrubs and the sowing of grass lawns.

In cemeteries towards the front, very little permanent work has as yet been possible, partly because they have been so recently in active use, and there has not yet been time to prepare a definite design for permanent treatment, and also partly because there is not yet a sufficient staff of men available for any work beyond that of keeping such places neat and tidy.

Despite these difficulties, however, the majority of our forward cemeteries present a remarkably well-ordered appearance, and great credit is due to the men in whose charge they have been placed. It has been our aim in all such cemeteries to produce as good an effect as possible by simple means, chiefly by the sowing of annuals and grass and by the planting of bulbs, and certainly, during the spring and summer months, the results have amply repaid the labour that has been expended on them.

That work such as this is appreciated at home we know well, but it has been even more appreciated, we believe, by our men in France. It was seldom that one could visit a military cemetery without finding several of our soldiers there examining the names on the crosses; and the moral effect of a well-ordered cemetery, bright with flowers, was, we understand, considerable. This perhaps is hardly a matter for wonder, as our cemeteries and the garden plots surrounding Clearing Stations or Field Ambulances were often the only bright and neatly kept spots in the midst of the prevailing desolation.

A large number of cemeteries were, of course, well within range of enemy guns, and in these horticultural work was scarcely possible; grave-digging often could only be carried out after dark and any work that was done was liable to destruction. Even cemeteries so situated, however, were not left bare and desolate—bags of seed of mixed annuals were sent to our officers in forward stations for distribution amongst their cemeteries, and these in the summer made a very effective display. In addition the graves have often been planted with small shrubs, herbaceous plants or box—brought in from derelict and abandoned gardens by the cemetery men—which have relieved the barrenness of many a wayside burying-ground in Flanders.

One of the chief difficulties connected with our work is concerned with the nature of the soil in the cemeteries. The sites are naturally chosen for their convenience, and it is, as a rule, a matter of accident rather than design should the soil happen to be favourable or the site one of particular natural beauty. Despite this, however, many a cemetery is remarkably beautiful either in itself, as when situated in some old country orchard (fig. 6) or in a wood, or alongside a copse, or on account of some commanding view which it gives towards the sea or over a wide expanse of river valley or open country.

The Italian front offers a great contrast to France. Not only are our cemeteries on a smaller scale, but for the most part they are in very beautiful positions, and afford the most varied possibilities for interesting horticultural treatment. Those in the Riviera and at Taranto will be planted with plants of a sub-tropical character, such as flourish in Lady HANBURY's beautiful garden at La Mortola.

Perhaps the most beautifully situated of all our military cemeteries in Italy is the one at Bordighera. It is surrounded by groves of date palms ascending the hills, and by fields of carnations, and to the south commands a view over the sea; when planted and completed it cannot fail to be a very lovely spot.

The cemeteries in the Asiago Mountains afford a remarkable contrast, with their fine bold masses of limestone and forests of fir trees. But little effort will be needed to convert each cemetery into a small rock garden and to establish in them the Saxifrages, Cyclamen, Gentians, and other alpine plants that flourish amongst the rocks close at hand. Thanks to the care of one of the Padres on this front, several of these cemeteries are already in excellent condition and planted with ferns and Saxifrages.

The Piave and Montello cemeteries are more like those of Northern France, and with the exception of those at Montecchio and Giviera have no particular natural beauty.

Neither in the cemeteries of the Venetian plain nor in those of the Riviera will it be possible, we fear, to grow grass as is being done in France, but dwarf rose bushes, Iris, and other carpeting plants will grow freely, and as good stone is also abundant it will not be difficult to plant and put in good order our graves behind the Piave front.

In the cemeteries of the Riviera group, and in those of the plain, we intend planting, wherever possible, the Italian Cypress, *Cupressus sempervirens* var. *pyramidalis*, perhaps the most suitable of all trees for the purpose and one which is such a typical and beautiful feature in every Italian landscape.

In Northern France the soil is one of the principal factors that have to be taken into consideration, for we have for the most part to deal with loam of varying depth, overlying chalk. In the fenland of the north within and near the Belgian frontier, the soil is usually good, though the sites may not be very attractive. In places where there is a good depth of loam the possibilities of successful planting results are assured; but often the surface soil is shallow and any planting work is attended with considerable difficulty. It is also unfortunate that there are very few places where Rhododendrons, Azaleas, and heaths can be grown with much chance of success, though very good results have been obtained at Boulogne.

In all cemeteries where the chalk is near the surface, there is the further trouble that in grave or trench digging a great quantity of the underlying chalk has been brought to the surface and, where special precautions were not taken, the good top soil has often been buried. When therefore permanent planting work is undertaken, a great deal of labour is involved in removing the chalk or other bad soil and replacing it with suitable earth. After the appointment of the horticultural staff, precautions were taken to set aside, wherever possible, the top layer of soil and to replace this on the surface after the graves had been filled in, but in the forward cemeteries careful work of this nature was seldom practicable, and the bad soil will have to be replaced when the work of their permanent planting is taken in hand.

In the important base cemetery of St. Sever, Rouen (fig. 3), where the subsoil is river gravel and sand with a thin surface soil of good agricultural earth, the sand and gravel had been brought to the surface

in the course of the earlier grave-digging operations, and all the good soil was buried owing to the lack of adequate supervision in the first year of the war. The site is open and liable to be scorched by the sun, and in this dry yellow gravel it was almost too much to expect plants to grow with any success. The sand and gravel, therefore, had to be removed and good top soil from a neighbouring field, mixed with manure, had to be put in its place. The cemetery being a large one, the work entailed was very heavy, but the results have amply repaid the effort, and in the summer this cemetery is now a quite beautiful garden.

The cemeteries which have afforded some of the most difficult problems are those near the sea, where the soil consists wholly or partially of blown sea sand. The two paramount difficulties in such places are the retention of the shifting sand and the finding of plants and grass suitable to such conditions. To overcome the first, wind-breaks have to be erected, inside which a screen of trees and shrubs can be raised which shall in time break the force of the prevailing wind—just such work in fact as has had to be done in works of coast defence, both at home and abroad. Then, when a fairly still area has been produced within the bounds of a cemetery, the planting problems can be faced. It is somewhat surprising to find that on the whole the sand is remarkably fertile, and it may, I think, be confidently anticipated that good results will be attained in such places in course of time.

With a shelter belt of Maritime Pine, Bolles' Poplar and Sycamore underplanted with Willow, Sea Buckthorn, and Privet, a beautiful and efficient wind-screen should be possible. In the cemetery at Étapes—one of the largest in France, which is skirted by the main line from Boulogne to Paris—the beautiful effect of Maritime Pines, retaining the banks of blown sand, is a conspicuous feature (fig. 5).

In this cemetery, until more efficient shelter can be established against the cutting winter winds, it is only possible to grow annuals, for even should there be any plants which the winter wind, charged with sand, does not cut to pieces, they are promptly eaten by the rabbits infesting the sand-hills. In the summer, however, a very beautiful effect has been produced by using for the most part blue, mauve, and white annuals, such as *Nemophila*, *Phacelia*, mauve and white *Linaria*, Single Asters, *Alyssum*, &c. These, with the background of the yellow earth, the pine-clad sand-hills and the distant view over the blue waters of the estuary, produce a picture whose beauty it will not be easy to forget. Grass is now being sown here to form the main ground-covering, but some time must elapse before the whole area is converted into a smooth green lawn.

That grass can be grown in such spots has been amply demonstrated, provided that time and sufficient labour be allowed; for around many a hospital near by, on exactly similar soil, lawns have been produced which would be the envy of many a seaside town at home. In all such places the inborn love of gardening, so character-

istic of our people, is very much in evidence. In the cemetery at Wimereux, where the soil consists entirely of blown sand, grass is growing well, and a very effective display has been produced there by the mauve flowers of *Nepeta Mussini* which, when in flower, makes a beautiful contrast to the sandy surroundings. In this same place, an avenue or alley-way of *Cotoneaster frigida*—with Sycamore to help as a wind-screen—has been planted, and should form an interesting feature, especially when covered in the autumn with its scarlet berries.

Here, and in many other cemeteries, the common flag Iris is an invaluable plant, and it appears to be as happy when growing in blown sand as it is in a stiff loam. This happens to be one of the plants appropriate for the graves of Indian soldiers, and wherever possible we are planting on or around their graves Iris, Marigolds, and Cypress, all plants which they regard as sacred and appropriate for cemeteries.

This leads me to mention that we are attempting to plant, in cemeteries where men from our Overseas Dominions lie buried, trees, shrubs or other plants characteristic of the countries whence they came to the defence of the Empire. In memory of the Canadians we have raised Maples, native both to the east and the west coasts of Canada, from seed specially sent to Kew from Canada. For the Australian graves, a large number of seedling Tasmanian Eucalyptus trees* (*E. Gunnii* and *E. whittinghamensis*) have been sent to France from Kew, which we hope may prove hardy in Northern France; while, for the graves of those who came from the Dominion of New Zealand, a quantity of cuttings of the Daisy Bush (*Olearia*) and *Veronica Traversii* have been struck at Kew, and have been sent to one of our nurseries in France for transplantation in due course to particular cemeteries.

I may mention that, like the French, we are using such perennial plants as the old-fashioned double white Pinks, London Pride, mossy Saxifrages, Cerastium, and Thrift for borderings to our graves and trenches, while Polyantha Roses, Lavender, Rosemary, Iris, perennial Iberis, small heaths &c. are planted where possible at the foot of each cross.

To mark with characteristic plants the graves of all the representatives of our Empire is, however, in these northern climes unfortunately impossible. South Africa, except by annuals, can have no permanent commemorative plant; nor, alas! can we show our respect, by any floral emblem, to our West Indian, West African, Malayan, and other Colonial soldiers who have fought and died in France.

For them, as for all, the grateful memory of their sacrifice in a great cause will ever remain enshrined in our hearts:

" Their bodies are buried in peace
But their name liveth for evermore."

* The seeds were very kindly sent to Kew by Miss BALFOUR from Whittingehame and by Mrs. BATEMAN of Brightlingsea, near Colchester.



FIG. 2. BALLETT.

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FIG. 3. -ST. SEVER, ROUEN.

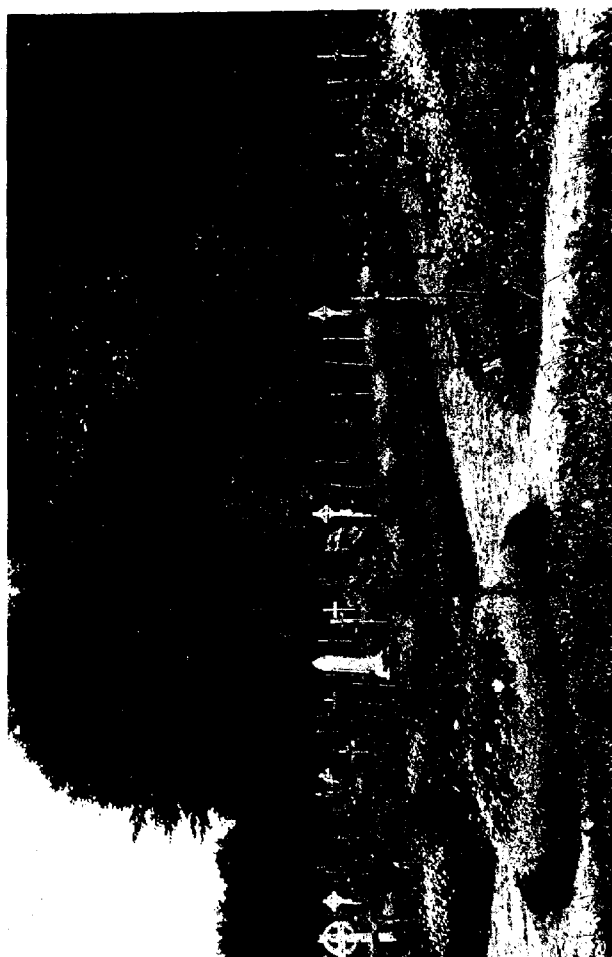


Fig. 4.—FORCEVILLE.



FIG. 5.—EQUATES.

Chap. 9.

I have so far referred only to those who lie buried in our well-ordered cemeteries, but it must not be forgotten that there are many who have been buried where they fell on the great Somme battlefield of 1916. The identification and reverent burial of those who fell in that great advance has been a great task finely achieved. Each grave has been surmounted with a white cross and enclosed with a wire fence. When I visited the region in July 1917, the whole of that desolate shell-hole region was transfigured and glorified by the common scarlet poppy, and the sight was more beautiful than any words of mine can express.

FLANDERS' FIELDS.*

In Flanders' Fields the poppies blow
Between the crosses, row on row,
That mark our place, and in the sky
The larks still bravely singing fly,
Scarce heard amidst the guns below.
We are the dead. Short days ago
We lived, felt dawn, saw sunset glow,
Loved and were loved; and now we lie
In Flanders' Fields.

Take up our quarrel with the foe,
To you from failing hands we throw
The Torch—be yours to hold it high;
If ye break faith with us who die,
We shall not sleep, though poppies grow
In Flanders' Fields. (Lt.-Col. John McCrae.)

Picture to yourselves a vast undulating landscape, a blaze of scarlet unbroken by tree or hedgerow, with here and there long stretches of white Chamomile and patches of yellow Charlock, dotted over with the half-hidden white crosses of the dead.

Smaller patches of Charlock were often conspicuous, and these usually marked the more recently dug graves where seeds, doubtless long buried, had been brought to the surface.

In no cemetery, large or small, however beautiful or impressive it may be, can the same sentiments be evoked or feelings be so deeply stirred. Nowhere, I imagine, could the magnitude of the struggle be better appreciated than in that peaceful, poppy-covered battlefield, hallowed by its many scattered crosses.

Not all who perished on that battlefield have been identified, but a cross stands at the head of every grave, sometimes bearing the inscription to "an unknown British Soldier."

For "Some there be who have no memorial; who are perished as though they had never been."

"Splendour unfading for their land they won,
And then the shadowy robe of death put on.
Yet died and are not dead; for their brave might
Fames, and uplifts them from the realms of night."†

* Printed in *Nature*, Feb. 21, 1918, p. 488, in the obituary notice of the author, Lt.-Col. John McCrae of the Canadian Army Medical Corps—also a Canadian poet. He published war poems in *The Spectator* and in *Punch*.

† Simonides' Epitaph on the Lacedæmonian Dead at Platea, translation by the late Dr. Walter Headlam, published in his *Book of Greek Verse*, p. 47. Cambridge University Press, 1907.

With regard to the permanent work in our cemeteries, it is necessary in the first place to protect them so that their sites shall not be obliterated in course of time, and to this end it is intended, wherever possible, to enclose them with a wall. Either within or without the wall a hedge of Thorn, Beech, Hornbeam, Yew, or Holly may be required, or a screen of pleached and trained Limes or Hornbeams to surround the cemetery—similar to those so often seen in France—may form a feature of the design. Within the cemetery itself, it is intended to rely mainly on the peaceful effect of a smooth grass lawn with each grave marked by its headstone, and to plant avenues and groups of suitable trees or shrubs.

In many places a small rose bush or other dwarf shrub has been planted on each grave, but as these cannot be expected to live for many years, it will be far more effective to aim at establishing eventually an even and unbroken surface of turf.

Before grass can be sown, much work will have to be done in producing a levelled surface by lowering the unsightly mounds of earth over the individual graves and by erasing the innumerable narrow pathways. In trench cemeteries the trench mounds are being similarly lowered and the narrower paths are being filled in in order to prepare a smooth surface for the grass seed.

A grass lawn which can be rolled and mown presents no special difficulties for permanent maintenance, but the keeping neat of a large number of small grass plots, which would have to be cut by hand, affords a problem beset with so many difficulties, especially when the number of the cemeteries is taken into consideration, that it must be put aside as impracticable.

Now that the work of permanent planting has become possible it has been found necessary to establish nurseries for the reception and propagation of the trees and shrubs destined for cemeteries. The plants have been or are being obtained from several well-known French and English nurserymen, and are set out immediately on arrival in one or other of the nurseries, there to wait until they are required for the places for which they were ordered. The first consignments, four in number, were received in the autumn of 1917 and each nursery was supplied by a different firm in order to obviate any confusion.

It was hoped that as the destinations were far apart and the firms distinct, the consignments would arrive at reasonable intervals. As it happened, however, three of them arrived at almost the same time, and to give you an idea of the work this entailed in war time I cannot do better than quote a portion of a letter I received from one of our horticultural officers in France telling me of the arrival of these 56,000 plants, which were unloaded and planted or heeled-in in six days.

" Things have indeed moved during the past week.

" On Monday last I started for M—— and called at the R.T.O.'s office to inquire if anything had come, and found it had.

" I went to the S.M.T.O. and asked for transport and he placed

a lorry at my disposal in half an hour. In two loads we had everything at the nursery and began heeling-in.

"On the morrow I took the corporal down and we checked it all. By 3 P.M. we had got everything into temporary quarters. The men have orders now to plant out properly all the small stuff, only leaving the big standards heeled-in. I left them about 3 and came on to H.Q., where I learnt that the consignment from Barbier had arrived at D—— and was being hauled. [This latter place is distant some 100 km. from M——.]

"I ran down there next morning and got things working properly and spent that day and the next in counting and checking while the men were planting out and trenching. In the evening I went to V—— [some 20 km. away], and though it was nearly dark I went across to the railway sidings and hunted up a sergeant-major and inquired about a truck from Paris. He said he thought there was one newly arrived, so I told him to get it along to the nearest spot to the cemetery to which a lorry could come, and this he promised to do.

"Then I went to the R.T.O. at A—— and found that the truck was on their sidings. In black dark and driving rain I stumbled over wastes of sidings till I found the truck and made sure that our own box cars could not haul it; so I had to find transport.

"I went to the Sucrerie, got a lorry at 8.30, but on going out to the sidings I found the truck in a place approachable by nothing less than a tank!

"So I raced off down the line till I found an engine—seized it and ordered it to come with me. It came along, hitched on to the truck and steamed off to where I had the lorry waiting.

"Then ensued a day of pure misery; rain, half a gale, and mud in endless and increasing quantities. But we got the truck unloaded in five trips by 3.30. I then sent the men into their hut and rushed back to D—— to supervise the planting work there.

"I found things running in a bath of oil. The sergeant pruning, our men planting, and planting well, and four men trenching the ground. Everything underground and safe from frost, and the whole place taking shape and order. A sight for sore eyes.

"Next day I got back to H.Q. in time for lunch and a change. I was wet and had been wet for two days, but I am quite fit and all goes well."

Many of these plants were put out in the cemeteries, and many were being retained for planting out later; but unfortunately two of our original nurseries fell into the hands of the enemy last year and all the plants were destroyed by shell fire. Many of the cemeteries too, where a considerable amount of planting of roses, hedges, and trees had been carried out, also fell into the enemy's hands and most of our work was destroyed during the great struggles and devastating fire of the advance and retreat. The destruction of work on which so much time, thought, and careful labour had been bestowed must, no doubt, be reckoned among the fortunes of war, but nevertheless

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it is a great disappointment to those to whom the work had been a labour of love. Though the loss and disappointment has been considerable, the damage has now been largely repaired, the cemeteries have been put into proper condition, new nurseries have been made, and further supplies of plants have been acquired for planting the cemeteries.

I have already mentioned that we are indebted to the British Red Cross Society and Order of St. John of Jerusalem for the funds which have made it possible to carry out the work already accomplished, and to those organizations we shall continue to look for the financial assistance necessary for carrying out all our temporary horticultural work in cemeteries in the Mobile Army areas. For the permanent planting and upkeep, however, the recently established Royal Commission will make itself responsible.

In addition to our grants from these sources we have also to acknowledge the receipt of many kind presents of bulbs, plants, and seeds which have been made by private individuals and by firms for general purposes in our cemeteries, and to all such donors we are very greatly indebted. Owing to innumerable difficulties of transport &c. it is almost impossible to permit gifts of plants for individual graves to be made.

Our one endeavour is to make these sacred plots—those fields in Flanders that are “for ever England”—worthy memorials to those who have given their lives in the cause of liberty and for the safety of our Empire. No wiser means of ensuring the attainment of this ideal could have been devised than the establishment and organization by H.M. the KING of the Imperial War Graves Commission on the application of H.R.H. the PRINCE OF WALES. His Majesty's nomination of His Royal Highness as first President of the Commission is a further good augury that the task entrusted to the Commission will be carried out in a manner worthy of the great cause.

EXPLANATION OF PLATES.

All the photographs were taken in July 1917.

Fig. 1. A portion of the cemetery at Varennes, near Acheux. The burials are in trenches and the photograph shows the trenches covered with mixed dwarf annuals. As this cemetery was not very far from the line when the photograph was taken in 1917, it was not possible to sow annuals in any definite colour scheme.

Fig. 2. A view in the cemetery at Bailleul. The burials here are in double trenches. The space between the cross was sown with taller annuals, such as Sweet Peas, Malope, Cornflowers, dwarf Sunflowers, &c. On the graves were long stretches of annuals, each stretch being of one kind and separated from the next by a broad band of grass or mignonette. The annuals were bordered by a broad verge of grass.

Fig. 3. St. Sever, Rouen. The trenches here are double as at Bailleul and sown with stretches of dwarf annuals separated by hedgerows of taller annuals between the crosses. Grass is now being sown as a general ground covering and a rose-bush planted at the foot of each cross. The hedgerows are being planted with Yews, Persian Lilac, *Berberis stenophylla*, *Philadelphus Lemoinei*, Roses etc., each hedge being of one kind of plant.

Fig. 4. Forceville. About one-third of the grave area next the cross is sown with dwarf annuals, such as *Alyssum maritimum*, Candytuft, pink Eschscholzia, &c., the other two-thirds being grass.

Fig. 5. Etaples. The cemetery is screened from the road by the bank of blown sand covered with the Maritime Pine. The soil of the cemetery is sticky clay over chalk and covered by sand. As the prevailing ground colour is yellow, the annuals used were mainly blue, mauve, and white, such as *Alyssum maritimum*, mauve and white Linarias, Phacelia, cream Eschscholzia, single mauve and white Asters, &c.

Fig. 6. Couin. The cemetery is in a beautiful apple orchard. All the graves are separate and sown with annuals near the cross, the rest of the grave being covered with grass. The annual Chrysanthemum 'Morning Star,' mauve and white Lychnis, *Alyssum maritimum*, Coctia, branching blue Larkspur, *Togetes pumila* and other annuals made a beautiful display here.

PRITZEL'S "INDEX."

By B. DAYDON JACKSON, Ph.D., Gen. Sec. L.S.

[Read January 28, 1919; Capt. A. W. HILL, M.A., D.Sc., in the Chair.]

I HAVE been honoured with an invitation to say a few words this afternoon upon "Pritzel, and the necessity for a Revision of his work, and the call on all Horticulturists to support it."

There are two aspects of a discourse such as this: First, the author may have chosen his own subject, one which he has specially studied, and in which he hopes to enlist the interest of his audience, presumably less informed on it than himself; and second, where the author has been provided with a subject in which many of his audience are interested already, some being possibly as well acquainted with it as himself, while a few may even excel him in that point. In the latter case, the speaker has a claim on the forbearance of his audience.

In the first place, who was the author? GEORG AUGUST PRITZEL was born, as Mr. GERALD LODER reminds us in the *Gardeners' Chronicle*, at Carolath, in Silesia, on September 2, 1815. The obituary notices give practically no details of his life, but from the "Allgemeine Deutsche Biographie" we learn that he grew up in poor circumstances, until at the age of 36 he secured an appointment as assistant in the Royal Library, Berlin. This was in the year 1851, which witnessed the completion of his well-known "Thesaurus literaturae botanicae omnium gentium" (the treasure of botanic literature of all nations), which was issued in parts from 1847 to 1851. It looks, therefore, as if the issue of this important work drew attention to his merits and gained him the appointment in question.

How he maintained himself during the period between the completion of his academic training and the publication of the first part of his "Thesaurus" seems to be unrecorded. We get a glimpse from the fact that in 1843 SCHAUER and WALPERS independently proposed *Pritzelia* for genera which have not been maintained; this recognition of Pritzel's merits is presumably due to the publication of his "Anemonarum revisio" in the year previous, from the journal *Linnaea*.

Four years afterwards his second important work, and that which specially appeals to this Society, came out: his "Icones Botanicarum Index Locupletissimus; Verzeichniss der Abbildungen sichtbar blühender Pflanzen und Farnkräuter aus der botanischen und Gartenliteratur des XVIII. und XIX. Jahrhunderts in alpha-

betischer Folge zusammengestellt" (a complete guide to botanic illustrations; a catalogue of flowering plants and ferns from botanic and garden literature of the 18th and 19th centuries), Berlin, 1855. A spurious second edition, with slightly altered title-page and preface rendered into English, is to be found, though repudiated by the author; it was probably a trick of his publisher, Nicolai, to sell the remainder of the stock. A thin second volume came out in 1865 bringing the references down to 1865, and that is how the matter still stands.

Mr. LODER thinks that the main work was probably compiled at the same time as his "Thesaurus," but I do not feel quite sure of that; it is possible that when he had printed his author-list by 1849, he may have entered upon the preparation of his second book, especially as the printing of his "Thesaurus" was not very rapid; still, the actual period of his work on this subject need not detain us. It may be noted that the year when his "Index" was published, 1855, was marked by his becoming "Archivar" to the Royal Academy of Sciences in Berlin, so that his two important books marked two important steps in his life. A second edition of his "Thesaurus" was taken in hand (presumably after he had completed the supplemental Index of 1866); this was altered in plan by omitting many of the entries of gardening books which had their place in the first issue, and naturally by including recent books, those published between 1847 and 1870, with some particulars of the authors, in a very useful fashion. Unhappily he did not live to finish this edition; the first four parts bringing it down to "Tournefort" were brought out in 1872, when the painful spinal disease from which he had suffered during many years made it impossible for him to continue. He died on June 14, 1874, at Hornheim, near Kiel. Dr. C. F. W. JESSEN was entrusted with the task of seeing the rest of the manuscript through the press, and of compiling the subject entries; the final part, comprising three fasciculi in one, came out in 1877.

Turning now to the volume on which I am called to speak, the names of genera and species are arranged in alphabetic order as printed in the books cited, and as explained by the author in his preface thus: "The compilation of a work, for which there was no prototype extant in botanical literature, was accompanied by many difficulties. The greatest possible completeness was the main essential; to what extent I have attained this requisite I have been informed by very gratifying testimonials from several monographers. Those whose studies have enabled them to take a comprehensive survey of botanical literature will not be surprised to hear that, in spite of my desire for completeness, I have nevertheless been obliged to reject more than 100,000 delineations as worthless. That amongst this large number there must have been many which would have been useful to some one or other, who would make use of this book for his own special purposes, is as little to be denied as that,

on the other hand, a considerable number have been enumerated which to others, more particularly to thoroughly scientific botanists, will appear superfluous. The various claims have been subjected by me to careful examination, and I have endeavoured to be just to each according to the measure of its apparent weight. I doubt very much if anybody desires to become acquainted with the thousands of little pictures of flowers in DEAKIN'S 'Florigraphia,' DENISSE'S 'Flore d'Amérique,' Miss JACKSON'S 'Pictorial Flora,' MORRIS'S 'Flora conspicua,' or LOUDON'S 'Encyclopædia' [of Plants], not to mention still more inferior productions. I cannot, however, avoid looking on it as a defect in my work that single good original drawings in works like LOUDON'S 'Arboretum,' BERG'S 'Charakteristik der Pflanzengenera,' LE MAOUT'S 'Leçons élémentaires,' FRANZ SCHMIDT'S 'Oestreichs Baumzucht,' KERNER'S 'Oekonomischen Gewächsen,' and others, have been passed over without mention. I can only defend this by the consistent carrying out of the principle I had laid down for myself, viz., having once selected a work for reference, to quote it throughout; this did not seem to me advisable to do in the case of the above-mentioned works on account of their containing so many illustrations that could well be dispensed with. When I come to publish a supplement which the appearance of more recent publications will under any circumstances render necessary, I will not fail to remedy this defect by mentioning the representations most worthy of notice contained in the class of works mentioned. On the same occasion also justice shall be done to other plates that have been left unnoticed which are to be found singly in particularly rare works, or in periodicals and in academical treatises that I have not as yet been able to obtain. My numerous friends and correspondents, to whom I am indebted for so much valuable co-operation in my by no means easy task, will, I hope, lay me under fresh obligations by their further assistance in supplying the various omissions they may still discover. For this purpose I will not fail to put before them in the 'Botanische Zeitung' a list of the rare books containing delineations of plants that I have not been able to obtain access to.

"The internal economy of the book was infinitely easier to decide on than the choice of what was to be admitted and what was to be rejected. An alphabetical arrangement, retaining the names under which the drawings had been published, proved itself on examination to be the most expedient method. A thorough correction of the synonyms would have been a labour of many years, and could only have been accomplished by some one of the few thorough systematic botanists that we still possess. To make these corrections in a few thousand instances, which I could have very well done, and to have left the great bulk untouched, would have been, as it seemed to me, a mistake that I congratulate myself on not having committed. It was otherwise with the nomenclature of some authors of earlier date, such as RHEEDE, RUMPF,



FIG. 6.—COUIN.

(To face p. 16.)

KAEMPFER, &c., in the correction of which existing commentaries and the references of more modern authors did me good service."

I do not think PRITZEL could possibly have done otherwise. Had he tested every name, and corrected the false ascriptions, he might never have ended his task. He was perfectly justified in cataloguing the names of plants as he found them, leaving it to experts to detect errors; his function was to guide enquirers for the scattered figures in a long series of volumes, or detached cuts in special volumes, almost entirely from the time of CARL VON LINNÉ onward. Two great works of pre-Linnean botany were excepted—that is, he included the "*Hortus indicus malabaricus*" of RHEEDE TOT DRAAKENSTEIN, 1678-1703, and the "*Herbarium amboinense*" of RUMPFIIUS, 1741-1755, both of which have determinations of modern names, of the first by A. W. DENNSTEDT and C. W. DILLWYN, of the second by A. W. E. T. WENSCHEL and J. K. HASSKARL respectively, which were at our author's service for citation.

One cannot repress a feeling of regret that, if any pre-Linnean books are to be cited, the noble woodcuts of FUCHS (1642), the Valgrisian edition of MATTIOLI (1565 and 1569), and COLONNA's etchings (1597 and 1616) should be excluded, but the question of renaming and of interpretation becomes a great embarrassment. There is one grave complaint to be brought against PRITZEL's method, and that is, in some cases he has given numbers for plates which are not official; apparently he put numbers to certain copies to which he had access, and quoted those numbers. The result is that his citations as regards these books are useless beyond stating that such figures are to be found somewhere in the volumes cited. As an example let me instance CURTIS, "*Flora londinensis*," 1777-98 (second edition, by W. J. Hooker, 1817-28), in folio, with admirable plates, but the references in PRITZEL do not help one to turn to the plates. A short time ago I was forced to draw up an index to CURTIS for my own use; it was afterwards printed in the *Journal of Botany*, vol. liv. (1916), pp. 153-164, utilizing the official numbers.

The fact now faces us that no printed record of the many excellent figures published since 1865 to the present day, a period of 53 years, is available. The *Botanical Magazine* has continued its regular and even succession of plates and has brought out a general index down to 1904, when Sir JOSEPH HOOKER retired from the editorial chair. There are now fourteen volumes since that date, and those of us who have to look up botanical plates have perforce to keep an index of them up to current issues.

But this series of volumes is a simple matter; we must remember the large number of periodicals—existing or defunct—separate volumes, publications of societies, a widely scattered literature which needs to be focussed for effective use. This, it is obvious, could be most easily done by a revision and reissue of PRITZEL's "Index." When done, it will be an invaluable help to all who have to determine plants or confirm their naming. Whether in one volume or

two, it will be a master-key to the illustrations in botanical literature of the last two centuries, which can only be consulted by our having the knowledge of their existence and being able to turn to the required plate without a wearisome and irritating loss of time.

The large herbaria, pre-eminently those of Kew and the Natural History Museum, have each a fine series of plates, arranged by natural families and genera. But these collections can only rarely be met with; they are costly to create and to keep supplied with current publications; they also demand much space—more space than any private possessor of a botanical library is likely to be able to spare. Even to these there are limits of access: it is quite practicable, as at Kew, to paste down on the same sheet the original drawing, the proof, and the published print of each plant figured in the *Botanical Magazine*, or where plates are to be obtained which have a blank on the reverse; but many excellent drawings occur as text-figures with printing on the other side, and that would demand two copies to comply with the requirement now stated. Indeed, this is the case at Kew, where, though the collection of plates is a splendid one, it has been found requisite to keep a copy of Pritzel's "Index" constantly posted up as far as possible.

It is agreed therefore that a new and amended edition of the "Index" is a great and pressing want. The next consideration is, how can this want be met?

I need hardly remind the Fellows that the republication on a modern basis of the work under discussion has been repeatedly raised at the Annual Meetings and discussed at many Councils. It is no secret that funds have been set aside to prepare a new edition, and, with a view to making a start after the conclusion of hostilities, the Council in November 1917 set up two Pritzel Committees—(a) To advise on the amount of information which those for whose benefit the revision will be mainly undertaken would wish the new "Pritzel" to include; and (b) to advise the amount of information which those familiar with the preparation of works of this class consider it may be possible to incorporate. In a Minute circulated amongst the members of these two Committees the above objects are compressed into (a) the maximum of information it is desirable to incorporate, and (b) the minimum of information deemed essential.

These Committees have met, and have shaped out a practicable method, which may roughly be summarized thus:—

All botanical plates are to be cited, and under the names employed by those responsible for the plates, but no attempt can be made to give the right name to a plant wrongly named, for, though possible in a few instances, it could not be applied to all, hence uncertainty would attach to the names cited; but obvious errors other than taxonomic should be put right. The pictures printed in such horticultural journals as the *Gardeners' Chronicle*, the *Garden*, and their foreign equivalents, are to be quoted. Some hybrids are to be included, and possibly some generic cross-references; also

references to plates in Floras where the plants are critically drawn : but the numberless garden varieties and forms must be passed over. A card catalogue of all entries is being made, and it is suggested that its home should be in the Library of the Royal Horticultural Society as a permanent catalogue, and be there kept posted up. The basis of selection was thus phrased :—

(a) All plates and drawings, whether produced from photographs or not, should be included if accompanied by a detailed scientific botanical description.

(b) All plates, drawings, and reproductions of sufficient botanical, horticultural, scientific, artistic or historical value should be included, even if the botanical description be deficient.

(c) That it should not be considered necessary to include all plates or drawings in a work selected to be cited, but only those which conform to the conditions eventually laid down.

(d) Cross-reference to genera where necessary.

(e) A list of the works cited should be drawn up, with the abbreviations employed, and authorities for the species added.

(f) Dr. STAFF, F.R.S., was appointed honorary editor, to supervise the work which is to be done at Kew by temporary members of the staff.

A summary may be best made by the following extract from the memorandum drafted by the Secretary of the Society :—

" . . . Not only is PRITZEL's book out of print, but as he finished his work in 1866, and as the last fifty years have been more productive of new plants discovered than any fifty years before, it may be imagined how absolutely necessary, from both the botanical and horticultural points of view, it is to bring PRITZEL's work up to date. Different scientific bodies, both here and in the United States, from time to time have made suggestions for undertaking this work of revision, but as yet none of their suggestions has taken effect, chiefly on account of the very large expenditure and scientific work it involves.

"The original 'Pritzel,' which must of course be reprinted, contains about 107,000 entries, and it is estimated that at least 125,000 more entries will have to be incorporated with them. Add to this that the above work being all so technical and scientific, and absolute accuracy so necessary, some idea may be formed of what the revision entails. A rough estimate has been given of the cost of preparing the manuscript for the printer, £1,500, and after that there will remain reading the proof—a matter which can only be done by a skilled botanist—and last of all there will be the printing itself, and taking this last item at pre-War figures the total cost will be little, if at all, less than £3,000 or £3,500, and post-War figures may even bring it up to as much as £4,000.

"The Royal Horticultural Society, being the premier horticultural society of the world, has at last definitely undertaken to carry out the work with the assistance of botanists attached to the Royal

Gardens at Kew and at the British Museum (Natural History), South Kensington, and the Linnean Society, and in friendly co-operation with the United States Government Plant-Bureau. On the R.H.S. alone, however, rests the financial responsibility, which has hitherto been the chief obstacle in the way of this absolutely necessary international scientific publication. Anyone unacquainted with PRITZEL's work can form some idea of its paramount importance by considering that if he wanted to find a picture of some rare plant he might hunt through the British Museum library for a week, and then perhaps not find it, whereas with 'Pritzel' at hand to refer to he would find it in one minute.

"In 1913 the R.H.S. began to raise the required amount, the International Horticultural Exhibition held in 1912 starting the Fund with a donation of £250, followed by £100 from the Veitch Memorial Trustees, and the Council of the R.H.S. voted £250, to which the Council have since added another £250 to enable the work to be begun. The work has now been actually started, the typists having accommodation found for them, through Sir David Prain's kindness, at Kew, and the whole is under the immediate supervision of the following Committee, viz. Professor I. Bayley Balfour, F.R.S., V.M.H.; Mr. E. A. Bowles, M.A., V.M.H.; Mr. F. J. Hanbury, F.L.S.; Captain Arthur W. Hill, M.A., F.L.S.; Dr. B. Daydon Jackson, Ph.D., F.L.S.; Mr. Gerald W. E. Loder, M.A., F.L.S.; Sir Daniel Morris, K.C.M.G., J.P., V.M.H.; Sir David Prain, C.M.G., C.I.E., F.R.S., V.M.H.; Dr. A. B. Rendle, F.R.S., V.M.H.; Dr. O. Stapf, F.R.S.; Sir Harry J. Veitch, V.M.H.—to which, as has been said, will be added direct assistance from Kew, South Kensington, the Linnean Society, and the U.S.A. Plant-Bureau.

"It now remains to collect the remainder of the finances required, and the Council hope that everyone, whether a Fellow of the Society or not, who is interested in plants botanically or horticulturally, will make some contribution to a work which for the next 100 years at least will be the standard work of the kind, and will form the basis of a future similar revision by our grandchildren or great-grandchildren in the next century.

"It is proposed to publish the names of all subscribers of £1 1s. and upwards in the Introduction to the new work, so that they may be known to those who come after as those to whom the new 'Pritzel' is due."

Nearly forty years ago I seriously entertained the project of revising PRITZEL's "Index," and discussed it with a well-known botanical bookseller and publisher. He dissuaded me from the project by pointing out that there was then no scarcity of copies, the volume being still obtainable from the publishers, and that the relatively short additional period of 15 or 16 years, even with the amalgamation of both volumes of "Pritzel," would not command a large sale; consequently no publisher would be likely to take the risk upon himself. The prospect therefore was that, after many

months or even years of labour, my time would prove to have been misspent and lost. I thereupon abandoned the prospect and turned to other work.

But the aspect at the present time compared with the past is greatly changed for the better. During the period of dormancy the scope of horticulture has both widened and deepened, and the lapse of time, now more than half a century since the second volume of PRITZEL'S "Index" was published, makes a new edition imperative. Under the auspices of this great and powerful Society the work now happily begun is assured of success, and I can now hope to see and handle the new "Pritzel" in my lifetime. It is a great pleasure to think that a work which attracted me in my early years is now being done, and I am glad in my declining years to be associated, in however small a degree, with the production of a book which must prove of immense and lasting service, both to the botanist and the horticulturist.

THE CARE OF THE SOIL.

By, H. [E. P. HODSOLL, F.C.S., M.S.E.A.C.]

[Read November 19, 1918; Mr. A. C. BARTLETT in the Chair.]

THE title of this article may seem strange to some, who will perhaps regard the use of the word "care" as misplaced in this relation. Surely, they will say, the soil can take care of itself. It has done so, for how many years? probably few of us would like to hazard a guess. It has been subject to great heat and intense cold, has suffered vast upheavals and convulsions and all sorts of marvellous changes, and yet in most parts of the world produces vegetation and crops of some sort or other, with or without human assistance.

This is all true in a sense, and yet the title is chosen advisedly, and we will endeavour to show that from the agricultural and horticultural point of view the word is not misused.

The reason for the choice of this title is that in journeying about the country one cannot but be struck by the lack of care, in the true meaning of the word, that the soil receives at the hands of some of its cultivators. So many regard it merely as a medium in which their crops grow. They cultivate to a greater or less extent to get a tilth in which to place the seed or young plants, or to produce conditions that they know by experience will benefit their crop. They manure it for the same reason, always with their eye on the crop and with little or no consideration for the soil.

This is all perfectly right as far as it goes—the crop is of course the ultimate object of all cultivation, and we have nothing to say against every consideration being given it; on the contrary, it is hoped in the near future to contribute a companion article to this on the "Care of the Plant." But the point it is desired to bring home is that the soil also requires attention—care—for its own sake; in fact, it should be the cultivator's first consideration.

The following is an instance of the lack of appreciation shown by many growers of the importance and value of the soil they are cultivating. Not long ago a sample of soil was received from a big grower for analysis, with an accompanying letter saying: "I am sending you some of the 'dirt' from my farm. I cannot get a decent crop on it, and I do not know what is the matter with it. Please analyse it and tell me what I am to do." One was struck at the time by the words used by this man in referring to "Mother Earth"—the soil he was cultivating—the raw material of his industry—and immediately suspected that this grower would not understand the phrase "the care of the soil."

HALL opens his well-known work on the soil with these words: "The

whole business of agriculture is founded upon the soil," and we have many times referred to it as the growers' raw material. All wealth proceeds from the soil, for it we pay rent or its equivalent, in it the plant grows, and from it (with or without the aid of manures) the plant draws its nourishment, or at all events that part of it with which we are concerned.

It is undoubtedly true that on capacity and skill in managing the soil depend to a large extent the quality and quantity of the crop. Surely then the soil is a thing to study—to watch, understand, and treat with all the available aid of practice and science.

Everybody knows that soils differ widely: the difference in rents paid is an acknowledgment of the fact. It is impossible to obtain either the weight or quality from some soils that may be confidently expected from others. The soil may be heavy or light, and there are innumerable variations between these two extremes. It is obvious that these soils require different treatment in cultivation and management, in manuring and in cropping. In order properly to manage the soil these differences must be studied, and reasons ascertained for any inferiority in order that defects may be, if possible, remedied.

The study of the soil, and the part it plays in the nutrition of the plant, falls naturally under three headings—the mechanical or physical, the chemical, and the biological aspect. Each of these headings could easily form the text for a separate paper, but it is only intended to glance at them in order to point the necessity for the care of the soil advocated, and to suggest the manner in which it may best be undertaken.

MECHANICAL.

Origin of Soils.—In order to understand the soil mechanically it is necessary to know something of its origin. As is well known, soils are formed by the disintegration of the rocks that compose the earth's surface. These rocks have been deposited under widely varying conditions and by many different agencies: great heat, extreme cold, violent convulsions, the action of glaciers, the submerging of the land under water, and all the many changes, climatic and otherwise, that the earth has undergone, have played their part.

The study of these phenomena and the classification of the various rocks according to the manner and period of their formation belong to the science of Geology, and it is not intended here to write a treatise on this fascinating science. It is sufficient for our purpose at the moment to remember the facts above referred to, as they explain the great variation of soils, both mechanical and chemical, which is the first point to which it is desired to draw attention. Except in the cases of soils of transportation—that is, soils that have been carried from above the rocks from which they were originally formed, *e.g.* "alluvial" soils—it stands to reason that the soil overlying a certain formation will bear a definite relation to the rock from which it derives its origin.

From the mechanical point of view this variation shows itself in the innumerable physical differences which we encounter in soils, from the very heavy clays to the lightest sands. These differences are entirely due to the varying size of the particles which go to make up the soil. A sand is made up almost entirely of large particles and a clay of small ones, some of them so small that they cannot be measured—so small that they run together to form gelatinous substances known as “colloids.” Between these two extremes we have the various grades of loams, marls, alluvial soils, &c., which are mixtures of sand and clay. The intelligent care of the soil that is here advocated is conditioned in the first place by the class to which it belongs mechanically—that is, whether the particular soil we are treating is a heavy clay, a light sand, or one of the loams or “alluvial” soils that fall between these two extremes. Fortunately many of our garden and intensively cultivated soils are mixed soils, which every practical horticulturist knows are the easiest to manage; but many of our most productive soils are clays, and many of our valuable early soils are sands, and the management of these, while not so easy, is often most profitable when done with success.

Let us first glance at the essential points in the management of a heavy clay soil. We have seen that the “heaviness” of such soils is due to the fact that they contain a large proportion of very fine particles, and that these particles are so fine as to form, when run together, a gelatinous substance that gives them what is known as their “colloidal” or adhesive properties. It is these “colloids,” which the potter spreads evenly throughout the bulk of his clay in the process of working it, that enable him to mould it to his will, and that enable the brick-maker to mould his bricks. The same thing happens when we get our horses on to a heavy soil while it is still wet, or when we turn up a wet furrow with too “slick” a side, or dig such a soil with a spade when it is wet. In all these operations we “puddle” the clay, we separate and distribute the “colloids” and spread them either throughout the mass, in the case of the potter and the bricks, or over a particular surface in the case of the furrow and the “spit” of earth that we turn over. It will be seen that when we separate and spread the “colloids” we get just the effect that as cultivators of such soils we do not want. It follows therefore that what we have to do is the opposite—that is, to segregate or collect them and so mitigate their effect on the soil instead of aggravating it. This then is the first consideration in managing a clay soil. How is it to be done? It is obvious that the aim of our management must be to unite these small particles and so lighten the soil by coarsening its texture.

The first point, as we have seen, is never to work it when it is wet. Directly we see the “puddling” effect described, we should stop the operation whatever it may be, remembering that by going on we are only giving ourselves extra work to undo the trouble later—an opportunity we may not get, in which case we may be faced with “cloddy” soil throughout the summer.

Having briefly enumerated the unkindly features of this class of soil, and what we must avoid doing in order not to aggravate them, we will now pass on to consider the treatment to be adopted to improve or correct them.

Drainage.—The first and fundamental condition of improvement is good drainage. We all know that if a heavy soil is badly drained it is almost impossible to work it properly. Water “puddles” the clay—the fine particles are obviously easily separated and carried by water and evenly distributed over the mass of the soil. In such a soil drainage is the first consideration. A badly drained soil is always wet and unkind in the winter, sets in clods, cracks, and is the first to suffer from drought in the summer. It is impossible in the scope of this paper to deal with this important question of drainage, but all who have reason to suspect that their soil is “water-logged” are advised to have inspection-pits dug about 3 feet deep wherever water is suspected, and to watch whether the water stands in them and does not freely get away. If drainage is necessary, pipe drains are the best, but box, bush, or stone drains are better than nothing and are easily made in a garden. In bigger areas, and especially wet pastures, great benefit may be obtained by the use of the “Mole draining-plough.” Let your main drain deliver to the lowest point in the field or garden, and remember not to run your minor drains down the slope but across it. This is a most important point. If you drain down the slope you merely drain the soil just over-lying the drain, but if you drain across the slope you catch the water between the drains.

Liming.—The next point is liming. The action of lime on heavy soils is fully explained in the article dealing with this subject published in the JOURNAL of the Society (vol. xlii.). It is sufficient for us to remember here that lime flocculates the “colloids” in a heavy soil, that it collects them together and prevents their distribution throughout the bulk of the soil, which, as we have seen, is our primary object. It is therefore obvious that in the care and management of a heavy soil liming must be resorted to from time to time.

Manuring.—The next consideration is the manuring of such a soil. In a paper headed “The Respective Values of Organic and Inorganic Manures,” published in the JOURNAL (vol. xli. p. 217), the mechanical effect of organic manures on various soils is dealt with, and it is pointed out that dung, shoddy, wool waste, and other bulky manures, open out a clay soil and let in the air, and are consequently of great benefit. It is also seen that humus flocculates the “colloids” and greatly improves the working of heavy soils, and that therefore organic manures should be used. An excellent instance of this effect of humus on clay soils may be seen in a ploughed-up pasture where even on the heaviest clays the soil is softer to the tread and breaks down more easily than is the case on the neighbouring arable field. Some mineral manures, such as superphosphate and sulphate of ammonia, owing to their acid residues, have a bad mechanical effect

and should be sparingly used on clay soils. Nitrate of soda also produces a similar result owing to the chemical action of its residue soda, which deflocculates the clay. Salt acts in the same way for the same reason and should not be used on heavy soils. Soot has its greatest effect on cold heavy soils and will be found very useful. So much for the treatment necessary to improve the mechanical condition of heavy soils.

Let us now consider the other extremity—the light sandy soil. We have seen that the sandy nature of a soil is due to the large size of its particles. Such soils are therefore liable to be too much like a sieve in that they let the moisture through them too quickly and with it the food materials that are dissolved in it. Our object, therefore, will be to bind them together and make them more like a sponge that will hold the moisture and less like a sieve. Light soils are generally deficient in humus, and owing to free aeration and great bacterial activity any humus added soon disappears. We must therefore, in dealing with these soils, remember that humus must be added, but bulky manures must be used carefully, otherwise they are apt to open these soils too much and make them hollow. When this mistake is made light soils dry out extraordinarily quickly. It must be remembered that a sand is largely dependent on sub-soil water for its moisture, and therefore nothing must be done to upset the capillary attraction by which the water passes from below to the root area near the top of the soil.

It is generally claimed that lime acts as a binding agent in light soils in the same way as it does in mortar. Light soils are frequently deficient in lime, and the point should therefore not be overlooked.

With regard to manuring such soils, as we have already seen, humus is very necessary, but on the other hand nitrate of soda may be used without harmful mechanical effect, and acid minerals may also be resorted to when necessary, provided of course that sufficient lime is present.

The intermediate soils are easier to manage. The considerations referred to above will come into play more or less according to whether a soil is on the heavy or light side. It may be noted that the management of all soils is largely directed towards the obtaining of the best water supply. In a clay soil we require to let the water through; in a sandy soil we require to hold it. In this connexion it is interesting to note the "colloidal" property of water. Water, as is well known, has to a certain extent an adhesive elastic nature. This is seen in the capillary attraction referred to above, on which we rely when rolling a soil in order to attract the moisture from below. The hoeing of a soil in dry weather has for its object the conserving of the moisture below the top few inches by severing the capillary tubes in the soil, and keeping a "mulch" of dry soil on the top. This is quite a different thing from the ordinary mulching resorted to in green-houses and in the garden generally, the object of which of course is to place a spongy layer on the top of the soil to hold the moisture.

CHEMICAL.

It is obvious that soils differ chemically just as we have seen them differ mechanically; in fact, far bigger variations occur. This is easily understood when the chemical constituents of a soil, as shown by chemical analysis, are examined. A moment's reflection on the widely differing origin and composition of soils will show us that this difference will be evident in their chemical constituents. The only way to ascertain this difference and to learn the percentage of the various essential ingredients in a soil is by soil analysis. Chemically, soils consist of humus and minerals: from the former is obtained the essential plant food—nitrogen—and among the latter are the essential mineral plant foods of which the chief are phosphoric acid, potash, and lime. There are others that are known as the minor essentials, but for all practical purposes we need only examine a soil chemically for its organic matter, or humus, and the nitrogen therein contained, and the mineral ingredients above referred to. The value of a soil analysis as showing the percentage of plant food a given soil contains, and its bearing on the manurial treatment of that soil, is far too big a subject to be dealt with here. The problem is not so simple as it appears, and it is certainly safe to say that a soil analysis requires very careful interpretation by a skilled agricultural chemist. This subject is touched on in "Some Hints on Manuring of Garden and Other Crops" above referred to. It is sufficient for our purposes to know the possibilities of a soil analysis as an aid to the care of the soil, and especially with regard to the estimation of lime, which we have seen plays so important a part in the correct management of all soils. Again, soils differ very considerably in the freedom with which they give up the chemical food materials they contain, and a plant can more easily obtain this food on a sandy soil than in a close-textured clay. Light soils will frequently grow heavy crops with far less food material, as shown by analysis, than heavy soils supporting poorer crops. This is a question of root activity and ease with which water percolates in a light soil. Further, crops differ in the food material taken and required, as is fully explained in the article last above referred to. All these questions are the province of the agricultural chemist; and a most interesting study is open here for the agricultural student. It is sufficient for our purposes at present to glance at this study to show that, to know a soil, the fullest chemical information regarding it should be obtained.

BIOLOGICAL.

Not very long ago the soil was held to be an inert mass containing the food materials of the plant referred to above. It is only recently that we have learned of the biological side. We now know that the soil is peopled by countless millions of bacteria, that these bacteria may be roughly divided into two classes—the beneficial and the

harmful. They form what may be termed the "life" of the soil, and they work for our good or our ill, largely according to how we treat the soil. This work is not carried on promiscuously but is wonderfully organized. Certain groups of bacteria do certain work, which is then taken up and carried on by another group, as it is in a perfectly-organized factory. We are largely indebted to RUSSELL and HUTCHINSON of Rothamsted for our knowledge of the work of these minute organisms. Students of this subject are strongly recommended to read "The Masters Memorial Lectures," given by Dr. RUSSELL, and published in the *JOURNAL* of the Society (vol. xli. pp. 173-188). It will be seen from those lectures that without the aid of these bacteria the dung and organic manures we apply to the soil are useless; in fact, all the rest of our care is useless unless the soil is made suitable for bacteria. It will be learned that the essentials for their life are moisture, air, lime, organic matter, and certain minerals, such as phosphates, all of which, it is interesting to note, are essential, as we have seen, in the care of the soil for other reasons.

The soil therefore is a wonderful and complex thing, far more than an anchor for the roots of trees. Its very origin sounds almost like a fairy tale. It is full of mechanical problems and forces; a complex chemical study, for every known chemical is found in it; a storehouse of plant food; the home of innumerable minute organisms working unceasingly for us, playing their part unseen, and for centuries unknown, in the great scheme of things, the great plan of Nature. Here is the answer to the problem of perpetual motion, and here may be found, in one form at least, perpetual life. Many things are yet to be discovered, yet to be learned, but do we not already know enough to fill us with wonder and awe and reverence for great Mother Earth, who gives all the minerals for our industries, the food for the plants, and through them for our beasts and ourselves, and receives us altogether—the plants, the beasts, and ourselves—when our appointed course is run? Is it a thing to be treated as "dirt," to be uncared for, unstudied? Is it necessary to plead further for the "care" advocated?—the study, the patience, the storing up of each valuable bit of knowledge until gradually one begins to understand and to know the soil one is cultivating? This is what is meant by "the care of the soil."

FREESIAS AND LACHENALIAS.

By Rev. J. JACOB.

[Read April 8, 1919; Mr. E. A. BOWLES, M.A., V.M.H., in the Chair.]

THERE is much more in common between these two families of plants than one might at first suppose.

Freessias and Lachenalias are both bulbous plants. They come from the same part of the globe—the Cape of Good Hope, or South Africa. They have both of them just missed being hardy in the British Isles, and need the friendly protection of a cool glasshouse in which to grow. The general outline of their cultivation is the same, viz. early potting, a cool temperature during their period of growth, a gradual ripening off, and then a period of thorough rest during which they must be kept dust-dry and warm. They both flower in the early months of the year. Lastly, they are both new-comers to our greenhouse flora, or, to be more accurate, they are reintroductions, for although members of both families were carried captive to Europe over a hundred years ago—as we may learn from consulting such picture-books of plants as the famous REDOUTÉ's "Les Liliacées," published from 1802 to 1816; and LEOPOLD TRATTINICK's "Archiv der Gewächskunde," published 1812–1818—for some reason or another they pined away and died, or, what amounts to the same thing in a practical horticultural sense, they disappeared from ordinary gardens, although here and there they continued to exist. The last point in their resemblance is the fact that they are both out to win their spurs of popularity as indispensable plants for the ornamentation of our glass-houses in the early months of the year; for although certain members of each family may be said to have done so already, as *refracta* among the Freessias and *Nelsonii* among the Lachenalias, it is certain that neither the one nor the other may make a similar boast, seeing the possibilities ahead, to Louis XIV. of France, who exclaimed "L'état, c'est moi!" The time is past when anything of the sort might have had some semblance of truth. It is a case of new men, new manners; or, if put horticulturally, new hybridizers, new seedling raisers, new blood; new varieties of divers shapes and colours, which cannot help arousing a widespread interest in both families. The main purpose of this paper is to introduce to public notice some of these novelties, in the hope that their enumeration and description may gain for them a wider cultivation and popularity than is the case at present. There are signs that Freessias are going to forge ahead, especially now that the new coloured varieties are becoming more widely known. Lachenalias up to the present have not made

such a promising start, but the time is bound to come when their quiet beauty and Marathon-like lasting powers will be appreciated by the flower-loving public.

FREESIAS.

South Africa is the home of the Freesia. Thence they have come at different times, beginning probably in the first decade of the nineteenth century with *refracta* and ending in 1898, when *Armstrongii* was brought over by the man who found it at Humansdorp and a single bulb given to Kew. It is the advent of this last arrival that has made possible the wonderful developments that are now taking place. Mr. WILLIAM WATSON, into whose hands the bulb was given, and who was the first to flower the variety in England, describes its colour as a rich rosy pink, and so I can only suppose that a writer in the *Gardeners' Magazine* was wrong when in describing the self-same plant he labels it "purplish."

Taking my cue from the ancient habit of giving to plants popular names suggested by some marked characteristic or some fabled or real use, such as 'Bear's Ears,' 'Eye-bright,' and 'Betty-go-to-bed-at-noon,' in the case of the Freesia I hazard the suggestion of 'Wait-and-see' flower as an appropriate nickname for this tantalizing plant. The why and the wherefore of this will be made clear later on. We must first of all consider very shortly its nomenclature and its history.

The Freesia, in the various names by which it has been known in Europe, calls to our mind the words and the moral of an old nursery rhyme :

Elizabeth, Elspeth, Betsy, and Bess—
They all went together to seek a bird's nest.
They found a bird's nest with five eggs in :
They all took one and left four in.

First the Freesia was 'Gladiolus.' As *Gladiolus refractus* and *G. xanthospilus* it is figured in REDOUTÉ's "Les Liliacées." Then it became 'Tritonia,' and as *Tritonia refracta* it appeared as the subject of plate No. 135 of the *Botanical Register*, on August 1, 1816. Finally, in the *Botanical Cabinet* of 1830, it assumes its present name of Freesia, and a picture is given of *Freesia odorata*, which was cultivated, the note says, outside in a frost-proof border. In "Linnæa" (1865-1866) F. W. KLATT, as it were, clenched this last name, and so it will remain until some enterprising botanist finds out something fresh about it and suggests another. Hence, as "Elizabeth, Elspeth, Betsy, and Bess" were one in the nursery rhyme, so are Gladiolus, Tritonia, and Freesia in the case of our plant.

The next question to be asked is, How many species are there ? In different books we find descriptions or references to *refracta*, *refracta alba*, *xanthospila*, *aurea*, *odorata*, *Leichlinii*, *Leichlinii major*, and *Armstrongii*. If we consult NICHOLSON, BAILEY, and garden papers like *The Garden* and *Gardeners' Chronicle*, we become at once aware that there has existed considerable diversity of opinion as to which

of these plants is which, and also as to which are of specific rank and which are not. Mr. JOHN HOOG, of Haarlem, who has paid great attention to the family, thinks there are three—*refracta*, *aurea*, and *Armstrongii*. Mr. W. WATSON, of Kew, thinks there is only one, and in a letter to the author of these notes writes: "BAKER says that there is only one species, and I see no reason to disagree with him." Now, as Mr. BAKER has made the tribe to which the *Freesia* belongs in a special way his own, and as Mr. WATSON is the curator of Kew, and has every opportunity of studying plants from living specimens, the joint imprimatur of these two men may be taken as "the last word." *Freesia refracta* is the one and only species; *aurea*, *Leichtlinii*; and *Armstrongii* are but Elspeths, Betsys; and Besses, or in other words "forms" of Elizabeth or *refracta*.

The Old Varieties.—What, then, is there to be said about these old originals, as they may well be called in contradistinction to the new seedlings which modern seedling-raisers are producing in ever-increasing numbers? If we compare the old *refracta*, which was cultivated about 1816, with the new seedlings we shall see the difference and variety of forms which have been produced in recent years. Some are like a "throw back," they are so similar in shape to the picture in the *Botanical Register* of the plant that LEE and KENNEDY grew in their nursery in 1816. Some of the others, more particularly the bloom which is named 'Daddy-long-legs,' show how great is the change that has taken place, and are a foretaste of what is about to come. *Refracta*, as it is now known, is a pure white with a yellow blotch on the lower centre segment, and sometimes in addition on the edges of those next it. 'Iscoyd White' is a fine form of this variety, and originated as a chance seedling in the gardens of Iscoyd Park, Flintshire. *Refracta alba* is a pure white variety, of which the American-raised form 'Purity' is probably the best. *Leichtlinii* is a beautiful pale yellow with an orange-yellow blotch. It was introduced into commerce by MAX LEICHTLIN, of Baden, who got it from the Botanical Garden at Genoa. A finer form, called *Leichtlinii major*, has been raised by C. SMITH, of Guernsey. *Aurea* is a small deep yellow, and was introduced by Messrs. WALLACE, of Colchester. Mr. HERBERT CHAPMAN used this variety in the production of his *F. × Chapmanii*, which, like all those just mentioned, is sweet-scented. *Armstrongii* is a "rich rosy pink" variety found by Mr. ARMSTRONG, a land agent, in the course of his professional travels at Humansdorp. He visited Kew in 1898, when he gave Mr. WATSON a bulb. This took good ways and thrived and increased, and in the course of time the hybrid *F. × kewensis* was raised from it. An account of this novelty, from the pen of Mr. WATSON, appeared in *The Garden* for 1901, p. 374. The back volumes of this paper contain numerous articles and references on the history and cultivation of both the *Freesia* and the *Lachenalia*, and should be consulted by anyone who takes an interest in their past.

Seedling Raisers.—The advent of first *aurea* and then *Armstrongii* has revolutionized the Freesia. Hybridists are now busy in producing new varieties, and as a result we have both colours and shapes of bloom that could never have been thought possible before their introduction. Mr. HERBERT CHAPMAN, of Rye, Messrs. C. SMITH & SON, of Guernsey, Mr. JOHN HOOG, of the firm of TUBERGEN of Haarlem, myself at Whitewell Rectory, near Whitchurch, Salop, and Mr. G. H. DALRYMPLE, of Bartley, Hampshire, are names which must be remembered in this connexion. During the early months of 1919 I received four, and Mr. Dalrymple three, Awards of Merit from the Royal Horticultural Society—that is to say, seven awards to new varieties were given in one year, which is a record, and is up to the present the high-water mark of British achievement.

New Varieties.—Appended to this paper there is a list of the awards which have been given to new seedling hybrids or varieties by the Dutch Bulb Growers' Society at Haarlem and our own Society in London. Some yellow seedling forms and a couple of very distinct small-flowered types of bloom, which ladies would very likely call "little ducks," will probably be found to be very useful for small four- and five-inch pots. One yellow variety, which is called 'Yellow Dwarf,' is very similar to *aurea*, which is still cultivated at Glasnevin (Dublin) by Sir F. W. MOORE, who sent me specimen blooms for comparison in the spring of 1919. 'Rose Beauty' received an Award of Merit, and its deep shade of "old rose" marks a distinct advance in deep-toned colour development. Unfortunately it has little or no perfume, but on the other hand it is exceptionally beautiful under artificial light, and when it becomes plentiful is one of those which will be valued for dinner-table decoration. 'Daddy-long-legs' also received an award. It is a tall loosely-growing variety, with large, very sweet-scented open blooms, with rather narrow segments of a rich purple colour with a conspicuous and effective big orange blotch on the lower part of the flower. 'Red Indian' shows a wonderful coppery-red development which, like the last, shows to advantage under artificial light. 'Lavender Queen' is a little like 'Merry Widow,' which received an award and which, by the way, is very sweet-scented. 'Orange Tip' is very similar to Tubergen's 'Contrast.' These white varieties, with very conspicuous deep orange or yellow blotches, will, with new ones added to them, form a delightful and popular series, which will be found to be most effective in a greenhouse. 'Pink Beauty' is one of the open type of flowers. It is of a lovely pale pink colour and very distinct. It is well to compare this with 'Daddy-long-legs,' since these spread-out blooms are a great break-away from the older, and what has hitherto been considered to be the normal, type of Freesia. 'Pinkie' is included because its colour is unusual—it is a clear, clean pink without any suggestion of blue. 'Blush Beauty' is very sweet indeed—a plant of tall and vigorous growth. It suggests possibilities of scent and growth, which may

become common as development or change proceeds. These new varieties give a very good idea of what we now have in the way of shape and colour. It will be noticed that there are no named yellow flowers except the small 'Yellow Dwarf.' The reason is that there did not appear to be such an opening for flowers of this colour as for others, seeing that Mr. CHAPMAN has given us *Chapmanii* and last year (1918) *Chapmanii aurantiaca*, and Mr. JOHN HOOG (Tubergen) 'Canary,' 'Buttercup,' and 'Apogee.' 'Canary' is, all things considered, the pick of the bunch, but it has not the deep, rich yellow tone of *C. aurantiaca* or of 'Apogee.'

Freesia Peculiarities.—It is from these peculiarities that the name 'Wait-and-see' flower has been suggested as appropriate:—
(1) The waywardness of the yellow spots in pure white flowers. To get a thicker and wider-petalled form than the 'American Purity' would be something worth having. Several times I have said to myself, "Hurrah! at last I have one!" only to have my high hopes dashed to the ground or blown sky-high (whichever phrase best expresses shattered expectation) when, after "one little, two little" flowers have opened of the purest white, the "third little" has developed the unfortunate mark. It has been suggested that the botanical explanation is that the latest fashion in shapes has caused the poor petals to get a little mixed up, and that they had to wait and see in these new developments which was top and which was bottom petal—hence their delay and uncertainty.

(2) The "breaking" or, were it tulips that are under consideration, their "rectification." Not that this word is at all appropriate according to modern ideas—the half-swear word "damnation" would be much more so, for, alas! most varieties suffer considerably from the change. *Freesia* 'Whitewell' shows the effect of the change when it is anything but flattering. In 'Chameleon,' where the colour varies very greatly with age, the effect is pleasing, but this may not be quite the same thing. We cannot discuss the question here.

(3) "Duds." Every grower of the new varieties has had the experience of good, sound, plump corms refusing to appear above ground after they have been potted in the most approved way in August or early September. Why is this? Different explanations have been offered. They may be "weary Willies"—that is that they have done so much one year that they must take it easy the next; or they may be "guzzling Georges"—they have not had all the food they require, and they want to have a good tuck-in before they start work again, only what they do eat in their retirement is a mystery; or, thirdly, and most probably, they are "chilled Charlies"—the poor beggars have caught a "couth" when they were being ripened off, or it may be after they have been potted, for to start these new varieties in a satisfactory manner they seem to require an atmosphere rather warmer than that of a cold frame. The evidence of growers distinctly points to a chill at some period

of the bulb's cycle of life being the determining cause—hence the necessity of a thorough ripening in a warm, sunny, perfectly dry place, and a genial atmosphere, say one of 50°, at nights when the bulbs are starting a new year's growth in August and September. One thing seems pretty certain, the old *refracta*, *refracta alba*, and *Leichtlinii* are less liable to produce "duds" than the newer additions to the family. It seems that the Freesia is not the only South African bulb that displays this aggravating habit—*Lachenalia aurea* is a great sinner in this respect. Hence, with regard to Freesias, you can pot the bulbs, but you have to "wait and see" what will happen. You know the old proverb about taking the horse to the water, but not being able to make him drink. One could invent a saying on all fours with it about Freesias—something like this: "You can pot a Freesia, but you can't make it grow."

Cultivation.—The year begins in mid-August. St. Grouse's Day (the 12th) is an ideal date on which to begin to pot the bulbs. All bulbs should be got in then or as soon after this date as possible, whether the flowers are wanted early or late. The difference had better be made by leaving some a longer time than others in the cold but perfectly frost-proof frame before bringing them into a very gentle heat. In this way I have had Freesias in bloom from January until April—a fairly long season, but one which might be extended by potting in July and bringing them on rather quicker than the others. Flowers may then be had at Christmas. Any good light porous soil which has been enriched by good old farmyard manure in the proportion of 1 to 4, and to which a good quantity of coarse sharp sand to keep the mixture open has been added, will be quite suitable. When growth is starting a *slight* heat is beneficial in case of the newer-coloured varieties at the start, but with regard to the older *refracta*, *refracta alba*, and *Leichtlinii* ones it does not seem to matter. Very little water is necessary until the flower spikes begin to shoot up, and the pots are in a genial greenhouse temperature. They require a good deal then; and at least once a week a drink of an artificial of some kind like "Clay's" is very beneficial. This feeding should be continued until the leaves have partly turned brown, when all water must be withheld and the pots stored in a sunny, dry place until the bulbs are shaken out and graded.

During December, January, and February a night temperature of from 45° to 50° Fahr. should be aimed at. Staking should be done in good time, so as to keep the stems upright and straight.

Raising New Varieties.—It is necessary, particularly until the end of February, to hand-fertilize all flowers from which seed is wanted. It is best to sow it in August, in six- or seven-inch pots, each seed being half an inch apart from its nearest neighbours. The pots should be placed in gentle heat from the start, and the young seedlings which will appear in a few weeks' time should be carefully grown on in a rather warmer temperature than that which suits the

older plants. Plenty of air is essential for all Freesias, and seedlings are no exception to the rule. A small number will flower in March, April, and May—that is, in from seven to nine months from the date of sowing. The general treatment to be followed is much the same as that for older bulbs. From the beginning of March until the yellowing of the leaves tells us that the little bulbs are wanting their period of rest, some mild stimulant should be given once a week in a liquid form. Then, when August comes round, the pots should very carefully be emptied of their contents so that the mother-bulbs and any little off-sets that may have been formed are not separated, but are kept together ready to put in the 3½-inch pots, in which they are to spend their second cycle of growth.

LACHENALIAS.

Lachenalias when they first came to Europe must have attracted attention in horticultural circles, otherwise the series of pictures in TRATTINICK'S "Archiv" and elsewhere would never have appeared. As this is not a botanical treatise there is no need to enumerate the various species or to group them scientifically. It is sufficient to speak of those which, together with a goodly number of seminal varieties, are to be found as cultivated plants at the present time. Why their number is not greater, and why man has not taken them in hand as he has done in the case of other families of bulbous plants, is not easily explained. They are quiet, unassuming creatures, which do not by stature, scent, or colour "stir it and stump it and blow their own trumpet," and so under modern conditions of success are out of it. Their whole being seems to be out of harmony with our bustling, strenuous life, and so they have never become fashionable and their devotees have been "few and far between."

Between 1770 and 1830 was, roughly speaking, the first era of Lachenalias in Europe, although MILLER, in his "Dictionary" in 1752, refers to *L. orchioides* as an old inhabitant of our greenhouses. In the second edition of the "Hortus Kewensis" in 1811 eleven varieties are enumerated, and in 1836 thirty-six in SWFET'S "Hortus Britannicus." Of these last two or three may be no longer Lachenalias but the number is sufficient to show that some interest was then taken in their cultivation.

The next era may be taken to have started about 1870. *The Garden* newspaper did much to encourage the growing of these bulbs by references and articles from the pens of Mr. F. W. BURBIDGE, the Rev. J. G. NELSON, Rector of Aldborough, Mr. W. B. HEMSLEY, and others, but all to little purpose. Mr. NELSON raised seedlings of which *L. Nelsonii*, first exhibited in 1881, is a lasting memorial of his work. A brother clergyman, Mr. MARSH, Rector of Cawston, did the same. Then Sir F. W. MOORE, of Glasnevin, tried his hand and gave us some beautiful varieties. He also contributed a most instructive paper to the R.H.S. JOURNAL (vol. xiii. [1891]).

Last of all I have given much attention to them myself, and but for the War more of my work would have been seen at Vincent Square. 'Rosemary,' which is one of the few that have appeared, has received an Award of Merit. The varieties may be grouped as those which have a red edge to their bells and those which have not. 'Greenland' has a more or less greenish look; and 'Burmah' has a more yellow look, and a very pronounced red top to its spike of flowers. 'Pekin' is a glorious yellow. 'Ostend,' 'Dublin,' and 'Lyons' show various forms and colours of edged flowers. Thus it will be seen that greater diversity of colour is slowly being evolved in the different members of the family. *L. glauca* is one of the sweet-scented species which are still to be had from dealers. Its general appearance—no stalks to the bells, which are hardly coloured at all—is similar to that of *orchioidea* and also *pallida*, which are likewise sweet-scented. Their perfume is like that of Lily-of-the-valley or yellow Genista. They are worth growing for this reason alone. Unfortunately they do not seem to cross with tricolor and quadricolor varieties, for if only scent could be introduced into such kinds as *Nelsonii* and 'Rosemary,' the public verdict on the race would be quickly changed. Besides the species already named, *L. racemosa* (white) and *L. pendula* are also to be found in our gardens. This last one is most distinct, being a pleasing shade of a bright brick-red, and is quite unlike any of the tricolor or quadricolor hybrids; moreover, as it blooms about Christmas when potted in August, it is a variety that should not be omitted by anyone who grows a collection of these useful Cape bulbs.

Cultivation.—What is sauce for the goose is sauce for the gander. The general principles which should guide us in the management of Lachenalias are the same as those which have been laid down for Freesias. Early potting in rich, light, porous soil, on or about August 12, cool treatment from start to the finish of their cycle of growth, a thorough ripening-off and rest before replanting again, constitute the main rules for growing them. The great difference is that if the plants are to be strong and sturdy they must never be put in a high temperature—not so high as that which suits the coloured Freesias. From 45° to 50° is what should be aimed at, as one or two degrees lower or four or five higher from time to time will be quite all right. They must have plenty of air, but cold currents of air playing on the leaves are fatal.

To look their best, all varieties of Lachenalias should be planted in shallow pots or round pans, which can now-a-days be bought from any seedsman. Their use makes an enormous difference to the *tout ensemble* of well-grown plants. Some growers use wire baskets lined with moss and with the interior filled with soil into which all round the sides and on the top Lachenalia bulbs are placed. With care in watering, grand, irregular balls of flower and foliage may be had, which are then very useful for suspending in a cool conservatory or in a glass winter garden, where frost is excluded.

Naturally, to get the best results in either pans or wire baskets, the bulbs should be carefully graded before they are planted. It will generally be found that there are a good many small ones hardly as large as a sweet pea. These may be planted in seed-pans and grown on if they are those of varieties which we wish to increase. Six bulbs in a five-inch pan or low pot, eight or nine in a six-inch one, is a rough guide to go by in planting. Larger pans must be filled in proportion. Feeding during the period of growth, and especially when the flowers are past their best, until the time when the foliage begins to turn colour, is necessary, and it is well to remember that they like their "tipple" a little stronger than that which suits *Freesias*.

Seedling-raising.—All who grow *Lachenalias* should raise seedlings. The young plants are so vigorous and strong that it is well worth doing. Hand-fertilization is necessary, for when they are left to themselves but little seed is produced. Seed should be sown in early August, and the pots or pans should be placed in a cool greenhouse and the seedlings kept growing as long as possible the following spring and early summer. After their period of rest the tiny bulbs should be taken out of the soil and replanted—one in a three-inch pot, or very thinly in good-sized pans. A few flowers will appear in the following flowering season, but it will not be until they have passed through another cycle of growth and have once more been potted up—this time in, say, 4-inch pots, keeping all bulbs of each sort together—that they will be seen at their best. In other words, seed sown in August 1919 will produce an odd bloom or two in February and March 1921, but their real flowering for the first time will not be until a year later. In sowing, every seed should be half an inch away from its nearest neighbour.

General Remarks.—Few flowers last longer in perfection than *Lachenalias*. Tulips, hyacinths, and daffodils cannot compete with them in this respect. They are popularly known as 'Cape Cowslips,' but they might be more appropriately called, from their general shape and look, 'Yellow Woodhyacinths.' I have seen splendid results attained yearly when they have been grown from start to finish in a dwelling-house, without even the help of a cold frame. Common-sense, care, and a knowledge of the plants' requirements have brought this about.

Varieties to grow.—*Glaucina* or *orchyioides* (for their delightful scent); 'Rosemary,' 'Cawston Gem,' *Nelsonii*, 'Brightness,' 'Ruth Lane,' 'W. E. Gumbleton,' 'John Geoghegan,' and *luteola maculata*. When they come into commerce, 'Greenland,' 'Holland,' and 'Burmah' should be included.

LIST OF AWARDS MADE BY THE R.H.S.

Freesias certificated in London,

Amethyst (Tubergen), April 16, 1907, A.M.
Aurea (Wallace), May 28, 1902, A.M.
Bartley Mauve (Dalrymple), April 8, 1919, A.M.,
Bartley Rose (Dalrymple), April 8, 1919, A.M.

Chapmanii (Chapman), March 5, 1907, A.M.
 Chapmanii aurantia (Chapman), Feb. 12, 1918, A.M.
 Daddy-long-legs (Jacob), March 11, 1919, A.M.
 Excelsior (Sutton), Feb. 24, 1914, A.M.
 Goldfinch (Dalrymple), April 8, 1919, A.M.
 La France (Chapman), Feb. 13, 1917, A.M.
 Lavender Queen (Chapman), Feb. 12, 1918, A.M.
 Le Phare (Tubergen), April 16, 1912, A.M.
 Merry Widow (Jacob), Feb. 25, 1919, A.M.
 Pinkie (Jacob), March 25, 1919, A.M.
 Refracta alba (New Plant Company), July 2, 1878, F.C.
 Rose Beauty (Jacob), Feb. 25, 1919, A.M.
 Rose Queen (Barr), Feb. 23, 1909, A.M.
 Tubergenii (Tubergen), March 6, 1906, A.M.

Coloured Freesias certificated in Haarlem.

Amethyst, soft mauve, Gold Medal, Haarlem, 1905; A.M., London, 1907.
 Tubergeni, carmine rose, white throat, A.M., London, 1906.
 Robinetta, ruby red, yellow throat, the darkest yet raised, A.M., Haarlem, 1912.
 Le Phare, bright rose carmine, A.M., London, 1912.
 Appleblossom, soft rose, exceedingly free flowering, A.M., Haarlem, 1914.
 Bluebeard, violet-blue, 1st Class Cert., Haarlem, 1914.
 Canary, soft yellow, orange spots, A.M., Haarlem, 1914.
 Giant, soft lavender lilac, rose tinge, strong, long stems, A.M., Haarlem, 1914.
 Preciosa, soft blue mauve, white and yellow throat, A.M., Haarlem, 1914.
 Apogee, soft primrose yellow, darker yellow tinged, 1st Class Cert., Haarlem, 1915.
 Buttercup, primrose yellow, orange shaded, large and vigorous, 1st Class Cert., Haarlem, 1915.
 Conquest, bright rose, very large flowers and spikes, A.M., Haarlem, 1915.
 Jubilee, rosy white, outside carmine, A.M., Haarlem, 1915.
 Iris, rosy mauve, A.M., Haarlem, 1915.
 La Frappante, soft blue, white throat, A.M., Haarlem, 1915.
 La Charmante, rosy lilac, A.M., Haarlem, 1915.
 Mouette, milky white, lilac tinge, outside carmine, A.M., Haarlem, 1915.
 My Pet, white, rosy tinged, A.M., Haarlem, 1915.
 Apothéose, lilac rose, extra large flower, 1st Class Cert., Haarlem, 1916.

Lachenalias.

Aldborough Beauty (Barr), March 10, 1885, F.C.
 Brightness (Moore), Feb. 13, 1906, A.M.
 Brilliant (Moore, Bennett-Poë), Feb. 28, 1905, A.M.
 Cawston Gem (Van Tubergen), March 10, 1896, A.M.
 Jean Rogers (Moore, Bennett-Poë), Feb. 28, 1905, A.M.
 Kathleen Paul (Moore), March 6, 1901, A.M.
 May Crosbie (Moore), March 5, 1907, A.M.
 Nelsonii (Nelson), Feb. 8, 1881, F.C.
 Phyllis Paul (Moore), March 26, 1901, A.M.
 Rosemary (Jacob), Feb. 8, 1916, A.M.
 Ruth Lane (Moore), March 10, 1903, A.M.
 Tricolor maculata (Glasnevin), Jan. 15, 1895 (as quadricolor maculata).
 W. E. Gumbleton (Moore), March 11, 1902, A.M.

THE PUBLIC PARKS OF GLASGOW.

By JAMES WHITTON, J.P., V.M.H., Superintendent of Parks
and Curator of Botanic Gardens, Glasgow.

[Read March 11, 1919; Mr. W. A. BILNEY, J.P., in the Chair.]

AMONGST the many problems which urban authorities are called upon to solve, not the least is that of providing "lungs" in the form of parks and open spaces in or near densely-crowded districts. In these districts the pure blue of the sky and the brilliancy of the sunshine are dimmed by smoke and foul vapours, and from their streets the glories of the starry firmament and silver moonlight, or even a blade of grass, are seldom or never seen by the children.

By the provision of such "lungs," and better sanitary surroundings, the tendency to degeneration of the town-born may be checked, and the lives of those who must live under unnatural conditions, and work in warehouses in closely-built, dingy streets, are made more healthy, happy, and pleasant.

The truism that a healthy body tends to make a healthy mind, without which no one can be a good or healthy citizen, cannot be gainsaid. It is due to the appreciation of this that municipal authorities everywhere are striving by the provision of parks, open spaces, and children's playgrounds to undo the evils resulting from the short-sightedness of their predecessors, who too frequently parted with the civic patrimony which ought to have been handed down unimpaired to their children's children, or failed to provide for the outdoor recreative requirements of the rising generations of an expanding city.

Indeed, the demand for football and hockey pitches, cricket fields, tennis courts, bowling greens, &c., in city public parks has become so great that a different view has to be taken in regard to the design and equipment of public parks from that insisted on in days gone by, and experience has shown that the views and ideas of many eminent landscape gardeners of those days have in a sense become obsolete.

In former days parks were in great measure set out for the quiet, restful, reflective spirit of easier-going times, and old ideas have had to be modified or superseded by arrangements probably less artistic but more adapted to meet the necessities of the activities of the present generation.

These changes are shown by a study of the requirements of modern public parks, more especially of those within our own island, where the area set aside for games has to be much greater than it was, say, half a century ago. While that utilitarian feature

is necessary and desirable, the fact must not be overlooked that parks which are provided and maintained from local rates ought to be, as far as possible, arranged to meet the tastes of all classes of the community.

Therefore, if it be hardly possible nowadays to lay out city parks satisfactorily on the old stately lines, there is nothing to hinder municipalities in meeting most of the modern requirements of those who demand quietude and restfulness in their hours of leisure in the open air, by the provision of these features which tend to that end in the shape of quiet nooks amongst noble trees, graceful and elegant shrubs, and hardy plants of all kinds, each possessing some feature, either in habit of growth, shape or colouring of leaf or flower, to attract the attention and interest of the great body of visitors.

If one can arrive at a sound judgment of public taste by close observation, then the tendency is towards a keener and closer examination of the subjects when the variety is greatest. Great masses of colour, though desirable in many respects for bold effects, may appeal to the casual passer-by, but do not create the enthusiasm of, say, a border of roses, sweet peas, carnations, pansies, and similar homely flowers; while a border of old-fashioned herbaceous plants, or even a moderate collection of dwarf and alpine plants, will have hundreds of regular visitors who keenly watch the development of their favourites during the season.

From an educational point of view such features in public parks are of incalculable value; and, while we may not all agree with the methods of nature study as practised by certain types of teachers, there are others to whom the variety of plants grown in public parks and gardens is a godsend by enabling them to find in these some subject to interest even the dullest pupil. Let us show how far Glasgow has met the views and ideas desiderated.

Glasgow, from its earliest period until comparatively recent times, appears to have devoted itself more to the cultivation of its industries and commerce than to the beautifying of its urban and municipal areas.

Historians have recorded that its surroundings were delightfully picturesque, and that the private gardens of its citizens were pleasant and charming. We have ample evidence of the truth of these statements, despite the fact that much of the natural beauty is now a thing of the past. There is also the old joke that Glasgow, "Gude Sanct Mungo's toun sae smeekey," is a place to get out of as quickly as possible. This libel we can laugh at, and though we have more smoke than we desire or care for, its presence is an indication of the vigour and push which have made our city one of the greatest in the Empire. It also indicates an evil which, unchecked, materially injures the health of the community and adds considerably to the difficulties attendant on the subject we are dealing with.

Glasgow, not being a capital city, nor one of Royal residence, possesses no park through Royal favour. London has its Hyde

Park and several others. Edinburgh has its King's Park, and Dublin the famous Phœnix—all of which, being Crown lands, are maintained by the nation.

Glasgow parks, with certain notable exceptions, were all purchased and all are maintained out of the local rates.

Prior to 1852 the only park in the city was The Green, and it is a matter for regret that the Town Council of the twenty-five years preceding that date did not secure two or three places as parks in view of the great increase of the city during that period.

Since 1878, however, the increase in the city in the number of parks and open spaces, whilst somewhat spasmodic and irregular at periods, has during the past quarter of a century been steadily progressing, and now for number and variety they will compare favourably with other cities of the Kingdom, London being excepted for obvious reasons.

While Glasgow has not yet attained to what is my ideal of a public park, viz. an area large enough for provision to be made for most outdoor games such as football, cricket, hockey, tennis, croquet, golf, and bowling; gymnasia, sandpits, &c., for the youngsters; a large lake where boating in summer and skating in winter might be enjoyed by the thousands of city dwellers who are penned up in the day-time in offices, warehouses, or factories; ample space for perambulation, as well as broad, well-kept lawns, with fine trees and shrubs and flowers, to give that feeling of repose and refinement which to thousands is the most health-giving power city parks possess; plenty of suitable rests and shelters for the weak, the weary and aged, along with the many other adjuncts which go to make for the pleasure and comfort of humanity—while my ideal has not yet been attained, considerable progress has been made towards that end.

We may now briefly describe the principal parks of the city, in the order of their acquisition.

GLASGOW GREEN.

Area 136 acres, acquired between 1660 and 1692, the oldest and, until 1852, the only park of the city. Bound up in the affection of native-born citizens, it has not infrequently been termed the "People's Park." Indeed, in very few cities in our country is there a public park whose history is more associated with its civic life than our venerable and beloved Green.

It is identified with the traditions of old Glasgow to a marked degree, and has been the scene of many gatherings, political and otherwise. From the times when the Trongate and Gallowgate, High Street and Saltmarket, along with the Briggate, formed the central part of the city, with the magistrates—of which the picturesque and immortal BAILIE NICOL JARVIE is the accepted type—holding the "plain stanes" with all civic dignity, down to prosaic

modern times, amidst all the toil and moil of a busy, bustling city life, despite its many unnatural drawbacks, it yet proves a healthful resort to the weary toiler whose aims and tastes are towards higher things than those of the hanger-on who lounges at the street corner or prostitutes his manhood by vicious indulgence in strong drink.

For generations it has been the rendezvous of those who desire to ventilate their grievances against all laws human and divine, as well as of those whose aims are for the regeneration of mankind socially, morally, and spiritually. No wonder, then, that it is beloved of the people, and any alteration is jealously watched in case such work would militate against what is regarded as the usefulness of the Green.

Time will not permit, even although it were desirable, to enumerate the many changes which have been wrought on the Green to bring it from what was but a "common" to a park to meet modern requirements. These changes began with the early years of the nineteenth century, when the pulse of the city's life was quickening towards expansion and improvement, in which the Green shared.

KELVINGROVE PARK.

Area 87 acres, acquired 1852-54 and 1881-1904. The rapid expansion westwards of the city, resulting in the covering-up of all the fields with streets of houses and the sweeping away of old landmarks, created feelings of dismay and alarm in the minds of thoughtful citizens, with the result that an agitation to secure one or more of the rapidly disappearing residential estates as an open space for the public resulted in the purchase in 1852 of the mansion and lands of Kelvingrove, at one time the country residence of a former Lord Provost.

This picturesquely situated property, through which flows the River Kelvin, was laid out from designs by Sir JOSEPH PAXTON. As a city "lung" it is ideal, but its steep slopes and lack of large flat spaces for games hardly meet modern requirements where active outdoor sports are in such demand. Like its forerunner, it has charms for the native-born. Most Scotsmen the world over have heard the song, "Let us haste to Kelvingrove, bonnie lassie O!"

Owing to its central position, and being so well served with tramway, subway, and railway facilities, it is an ideal site for International Exhibitions. Three of these, held respectively in 1888, 1901 and 1911, were conspicuously successful. These Exhibitions necessarily caused serious alterations in the original contours of the park, though in the restoration advantage was taken to make various improvements. Amongst these were the erection of the splendid Art Galleries and Museum, which is managed by the Corporation, the building of two handsome stone bridges across the River Kelvin, the formation of four public bowling-greens, and, by cutting off an unnecessary carriage drive, a much larger playground for children.

When acquired, this park was noted for its fine old trees. It is a matter of painful regret to see these gradually dying out, and it is not an easy matter to rejuvenate arboreal vegetation in a place where the conditions of the surroundings militate so severely against plant life. A considerable variety of deciduous trees have been planted in this park, amongst which a large variety of hawthorns may be instanced as an object-lesson in proving the value of that family for planting in smoky towns.

THE QUEEN'S PARK.

The success of the Kelvingrove Park caused the municipal authorities to look southward for a park to meet the requirements of the city which was extending in that direction. It is said that feeling was somewhat keen on such a project, as the park was two miles from the centre of the city and without the city boundaries, and the proposal to purchase was only carried by the casting vote of the Lord Provost. Men's minds, like the city itself, have expanded considerably since 1857, when the eastern half of the estate of Camp-hill was acquired, to form what is now the Queen's Park. This also was laid out from plans by Sir JOSEPH PAXTON. For over thirty years the park was without the city boundaries, but with the passing of the City Extension Act, in 1891, several smaller burghs created by the overflow of the city were then amalgamated within the municipal area along with this outlying park. In 1894 the western half of the estate, with the mansion-house, was purchased and added to Queen's Park, thus including what was the natural and dominating feature of the landscape. In this latter purchase the Old Caledonian or Pictish Camp, from which the estate derives its name—Camp-hill—became the property of the city. When the park was laid out in 1858-60 a large variety of trees and shrubs were planted, and many have now attained fair dimensions. Unfortunately, through some peculiar idea regarding treatment, the central leaders of nearly all the trees were pruned off, with the result that few will ever attain the dignity of fine-boled trees, and the majority will be but glorified bushes. The park retains much of its old-world air, and is considered to be one of the most delightful and most popular places of resort within the city's boundaries.

ALEXANDRA PARK.

In 1869 certain city improvements were being carried out, amongst which was the formation of a park for an expanding district to the east of the city. The area at first was about 79 acres. In 1891 other 40 acres were purchased, but as the formation of a new street and a railway divided up the property, only about twenty acres were added to the park, the balance being conveyed to other Civic Departments. Being in close proximity to iron and chemical works, as well as to a huge extension of the city's gasworks, combined with

the drawback of a poor, cold, clay soil, the situation is anything but ideal for the growth of such vegetation as is desired towards the arboreal furnishing of a public park. Here we had a valuable object-lesson regarding the use of trees and shrubs unsuited for the situation, as the bulk of the earlier planted trees, especially the poplars and willows, did not last quite twenty-five years. The replanting with other species is gradually making good the loss, but it is not easy to make up a leeway of a full generation.

CATHKIN BRAES PARK.

Situated six miles from the city, with an area of 49 acres. This park was given, in 1886, to his native city by the late Mr. JAMES DICK, who made rather strict conditions as to its use and treatment, as he desired it to be kept as nearly as possible in its natural state. His wishes are faithfully adhered to. The situation being high, it commands a magnificent view of the city and lower reaches of the Clyde valley. Yearly it is increasing in favour, and on public holidays is a popular place of resort.

With the passing of the City Extension Act of 1891, a new epoch in the history of the parks system began. Provision had to be made for parks and recreation grounds in the district annexed, apart from any which happened to be within the added areas. One of the most important acquisitions was that of the Gardens belonging to the Royal Botanical Institution of Glasgow, situated in the western district. Of the difficulties and struggles which the old Royal Botanic Society had in maintaining these Gardens we cannot fully enter upon here. Suffice it to say that it takes much enthusiasm, as well as money, to maintain a Botanic Garden which is not subsidized by the State or a municipality. Looking back on the history of these Gardens, one hardly knows which to admire most—the perseverance or the liberality of the promoters. All honour to them in their great work! There is, however, a limit to everything, and the struggle was too one-sided and too severe to last. Fortunately for the city, the Corporation took up the burden, and the citizens may rejoice that they now possess not only a delightful resort, but an institution which plays an important part in the educational forces of the city.

To many strangers the keeping-up of a Botanical Garden by a municipality is somewhat of a surprise, as usually such institutions are owned and entirely maintained by the State, such as those of Kew, Edinburgh, and Dublin, or by a University, as at Oxford and Cambridge. I may say, however, that Liverpool and Belfast Corporations now own and control Botanic Gardens similar to those of Glasgow, and probably at no distant date Birmingham and other cities may follow suit and rescue their Gardens which struggle on under adverse circumstances from the oblivion which threatens them.

RUCHILL PARK.

Significant name!—which, anglicized, means Roughhill. How this place came to be purchased as a public park is somewhat of a mystery. The only trees on its area were a few miserable specimens alongside of what had been the avenue to a mansion, and a few overgrown hedges dividing the fields of a badly cultivated farm, with, on its western side, a variety of industries such as oil, glass, bottle, iron, and chemical works, all emitting smoke and fumes inimical in the highest degree to plant life. The only redeeming features were its proximity to a densely populated area in the northern section of the city and its altitude, from which, under favourable conditions, splendid views northwards are obtained of the hills of Dumbarton, Stirling, and West Perthshire. As there was hardly an acre of level ground in the park, it was somewhat of a puzzle how to adapt it for general park purposes. However, it was tackled, with results which have been fairly successful considering the many disadvantages of the situation. The question of finding out what, in the way of trees and shrubs, in dismal surroundings, bad exposure, and poor clay soil, would exist—not to say thrive—opened a field for experiment; so, along with the reliable hawthorn, everything that had any apparent prospect of living was tried, with, in many cases, surprising and satisfactory results, thus giving a wider and more varied selection of material for planting in similar situations.

SPRINGBURN PARK.

Situated in the north-eastern part of the city, this park has the highest altitude of any within the municipal boundary. From its highest point magnificent views are obtained of the Kilpatrick and Kilsyth hills; while through the valley between these ranges are seen many of the mountains of mid-Perthshire. Not infrequently, when atmospheric conditions are favourable, Goatfell and other Arran hills, as well as those of lower Argyllshire, are seen to the westward. This park, like Ruchill, was anything but well cultivated, doubtless due to the fact that the underlying minerals were more important than what could be raised in the way of agricultural produce from the poor surface soil.

The disposal of the huge heaps of material from the iron-stone pits was one of the problems to be solved, along with others, to adapt the situation for public park purposes. Through time, with dogged perseverance, the difficulties have been overcome and assisted by the generosity of the Messrs. REID, of Hydepark Locomotive Works, who even gave the magnificent Winter Gardens and bandstand, and defrayed the cost of removing the latter to a new position after having been nearly twenty years in a somewhat unsuitable situation. With additional ground for football &c., this park is now one of the best equipped, having bowling-greens, cricket and football pitches,

tennis courts, model yacht pond, also two ornamental ponds for waterfowl and plenty of swings for children.

The growth of trees and shrubs has been satisfactory considering all difficulties, and the transformation of an old sandstone quarry into a wild rock garden has changed the bare exposed place into one of interest and pleasure.

MAXWELL PARK.

This small park, given by Sir JOHN STIRLING MAXWELL of Pollok to the burgh of Pollokshields, also came into the possession of the city in 1891. Though limited in area, it admirably suits the needs of the locality, which is purely a better-class residential one. Fairly well equipped, it has a model yacht pond, courts for lawn-tennis &c., swings for children, and the inevitable bandstand! Most trees and shrubs thrive well, but owing to the peaty nature of the soil—the place was within memory a peat bog—the most noteworthy are the Rhododendrons, which luxuriate better than in any park within the civic area.

POLLOK GROUNDS.

Mention might be made here of those grounds, seeing that the entrance thereto is within a short distance of the aforementioned park. Part of the well-wooded policies of Pollok, to the extent of 121 acres, has been granted for ten years—free of rent—to the Corporation for the use of the public by Sir JOHN STIRLING MAXWELL. In that area there is a grass field of about 20 acres for picnics, games, &c. The paths through the grounds have been extended to admit of the public having more scope to admire the sylvan beauties of the situation. Full advantage is taken of the privilege by the public, and in the spring and early summer months, when the thousands of Rhododendrons, along with the indigenous wild hyacinth or blue-bell, are in bloom, as well as when in autumn the foliage coloration is in its glory, the citizens appear in hundreds to enjoy the scene. The period of ten years expires in 1921, and whether the privilege will be renewed for a further period it is impossible to say, but in all probability it will. Here a slight digression from our subject may be allowed by stating that, in dealing with their lands adjacent to overgrown cities, few have dealt more generously, in regard to space and conditions, to preserve the general amenities of the city than the MAXWELLS of Pollok. Glasgow would have been a brighter and better place to-day had all proprietors dealt as generously with their property.

BELLAHOUSTON PARK.

The acquisition of this park in 1895, the largest within the city boundaries, is an example of looking forward and securing ample space in the southern districts of an ever-growing city, though at

the time of purchase objections were raised that the park would serve certain outlying burghs more than Glasgow. While true to a certain extent, the same spirit which inspired the acquisition of the land now occupied as the Queen's Park inspired the Council in this case, with results somewhat similar.

Queen's Park was in existence for over thirty years before the surrounding burghs were annexed, and, in 1912, the burghs in proximity to Bellahouston were absorbed and now reap all the benefits provided by the larger community. The park is bounded for over a mile by the main road between Glasgow and Paisley, which is probably the busiest highway in Scotland. From the high ground, or hill, which forms the central part and dominates the whole, there are splendid views of the surrounding country. To the north-east and east, the towers, spires, and tall chimneys of the city stand out prominently amidst the great mass of grey masonry. Due north, the great shipyards of Govan and Partick are much in evidence, as also the many industrial works associated therewith, and great ranges of tenements on the rising ground behind, while beyond are the Dumbartonshire and Stirlingshire hills. To the west the view is extended down the valley of the Clyde to Clydebank, Dalmuir, and Dumbarton on the north side of the river, and on the south bank to the old town of Renfrew. To the south-west is the town of Paisley, then further due south are the Gleniffer and Fereneze Braes, the town of Barrhead, with a range of hills and the outstanding "Neilston Pad"; then following are the high lands of the Mearns and Cathkin towards the south-east of the city, thus completing the circle—wider and more varied scenery than is possessed by most parks in this or any other city.

Provision is made in the park for bowling, football, hockey, cricket, golf, &c., and a large 15 to 20-acre lake is contemplated.

TOLLCROSS PARK.

To secure a suitable park in the eastern district of the city was a matter of some difficulty. Fortunately, through the efforts of a worthy citizen, the mansion and policies of Tollcross were purchased at a reasonable price in 1897. This purchase saved one of the last of the beauty spots left in the immediate vicinity of that part of the city, where huge iron and other industrial works are much in evidence.

The policies having been well laid out by the last proprietor, very little beyond widening the paths was required to make available for public use the main portion of the property, especially the beautifully wooded glen through which flows a stream whose pristine purity is frequently marred by unsavoury abominations from chemical and other works beyond the city boundaries. The mansion has been adapted as a branch of the Natural History Section of the Corporation Museums. The gift of his glass-houses and collection of plants by a former chairman of the Parks Committee to the park

formed the nucleus of a fine range of conservatories which are open daily to the public, who enjoy seeing more orchids there than probably will be found in any public park in this country. There are three bowling-greens, bandstand, &c. Football and cricket pitches were being formed, but, as the areas were requisitioned for garden allotments during the War, some time must elapse ere these games can be accommodated.

RICHMOND PARK.

Attempts were made for many years, with the view of meeting the requirements of the residents in the matter of recreation ground in the industrial area south of the River Clyde, to purchase what to all intents and purposes was waste ground badly broken up by mining operations in extracting the underlying coal, but the price asked was prohibitive. However, in 1898, through the exertions of Sir DAVID RICHMOND, who was Lord Provost at the time, a settlement was effected at two-thirds less than what was originally demanded. The price paid, £1,000 an acre, was heavy enough; but the transformation of a wretched piece of land, with only a few blocks of miners' houses thereon, and these not of a high class, with hardly a tree or bush on its surface, to a well-ordered park, fully equipped with bowling-greens, yacht pond, children's playgrounds, &c., is a matter of satisfaction to all interested in municipal work who are desirous of improving the amenities of the city. The difficulties attendant on getting trees and shrubs established are gradually being overcome, and, despite the destructive tendencies of the rising generation, the arboreal vegetation is fairly satisfactory.

ROUKEN GLEN PARK.

This unique property, which is about six miles from the centre of the city, was given in 1906 to the Corporation as a public park by Lord ROWALLAN. In these 135 acres stand the mansion-house, gardens and policies, and the glen known locally as the "Rouken." Some maintain that the term was originally "Reekin," literally "smoking" in English, from the fact that under certain conditions the spray from the waterfall created an appearance of mist or smoke. The popular name "Rouken Glen" was applied to the park to distinguish it from the estate generally of Thornliebank.

The natural beauty of the place, with its pretty waterfall and stream, along with the nicely-wooded glen and fine trees throughout the grounds, at once appealed to the citizens, and despite its distance from the city it immediately became a popular resort, especially on Saturdays and Sundays. The Corporation Tramways Department quickly realized the possibilities of the place, and extended their system to it by laying a double-lined track. This proving inadequate, they made further extensions by connecting the lines to those in Pollokshaws, and by so doing the public have now a choice of two

routes, which in fine weather and on Sunday afternoons and evenings are overtaxed with a one-minute service of cars. Beyond widening the existing paths and forming new ones to connect and link up accesses to various points, to meet the requirements of the crowds of visitors, no general alterations were made on the grounds. The endeavour has been to retain the natural features in every possible way. The natural seclusion is such that, though within half a mile of the large dyeing and bleaching works of Thornliebank, not a sign of any important industry in the near proximity is visible, except from a high point in the grounds, from which two or three tall chimney-stacks can be seen.

Of the many munificent gifts made to the city by its wealthy sons, none has surpassed in usefulness and appreciation this princely gift by Lord ROWALLAN, whose liberality will be again alluded to.

POLLOKSHAWS PARK.

With the extension of the city boundaries in 1912, when the burghs of Pollokshaws, Govan, and Partick were absorbed, the parks belonging to these communities came within the city. Of those belonging to the old-fashioned burgh of Pollokshaws little need be said, as they are but minor open spaces—though in a short time a park will be formed, as Sir JOHN STIRLING MAXWELL has recently given 13 acres to extend the largest of the open spaces.

ELDER PARK.

Of the parks belonging to the old burgh of Govan, the principal is the Elder Park, given by the late Mrs. JOHN ELDER in 1885. The area is 35 acres, and is on the opposite side of the street from the famous Fairfield Shipbuilding Yard, of which her husband was long the head and moving spirit. It is furnished with a model yacht pond, good shelters and bowling-greens, with nice open spaces for the children, but one of the provisions of the deed of gift is the prohibition of football—a somewhat sore point with the rising generation.

PLANTATION PARK.

The other park which belonged to the burgh is Plantation Park, which is over 1½ miles from the Elder Park. Its original area was about 7½ acres, but since the amalgamation with Glasgow an additional 7½ acres have been acquired, which will be laid out for football and other games to meet the needs of the youngsters of a densely crowded area. Meanwhile it is occupied by garden allotments.

VICTORIA PARK.

This was the principal park of the burgh of Partick. This park was not purchased by the burgh commissioners, but feued from the Scotstoun estate at a low sum per annum, with the proviso that

should Partick ever become part of Glasgow the annual amount payable would be the building site price. The sum payable is £355 per annum! The original 45½ acres has been twice added to, so that now its area is fully 65 acres. It is equipped with a bandstand, shelters, football ground, and swings for the children. The glory of the place, however, is the world-famous "Fossil Grove," in which the basal stumps of arboreal horsetails and other forms of vegetation of the pre-glacial period are *in situ*. The further preservation of this place, and the development of its surroundings, were under consideration when the Great War put a stop to all schemes of new work.

LOCH LOMOND PARK.

The most notable addition to the city's parks within recent years was the purchase of Balloch Castle estate, situated on the east side of Loch Lomond, and twenty miles from Glasgow. The acquisition of this estate of 812 acres, to furnish a park where the citizens could spend a holiday by the side of the famous Loch, created keen interest far beyond the city bounds. The Corporation had to obtain special powers from Parliament before it could be purchased and maintained from the city rates. The estate comprises four farms and the castle policies. It is the latter part, extending to not less than 200 acres, which has been set aside as a public park. The western frontage extends along the shore of Loch Lomond for fully a mile.

Though somewhat distant from the city, it is already a popular resort during the summer months on Saturdays and Sundays, as well as on public holidays, and will be more so when railway facilities are again normal. During the past two years it has been extremely popular with the Overseas troops, Australians and New Zealanders predominating. Their interest in the country of ROB ROY was intense, while their knowledge of the local history was fuller than that of most of the natives.

Apart from the requirements of the general holiday-maker and the historical associations of the district, there are great possibilities here from the horticultural and arboricultural aspect. Over fifty years ago a considerable number of rare trees and shrubs had been planted, and though the place had been somewhat neglected and much damage done by storms during the past twenty-five years, sufficient evidence remains of the potentialities of the situation. Meanwhile, plans are being formed which, if carried out, will enhance the interest and beauty of this unique park.

MINOR OPEN SPACES.

Of the many minor spaces throughout the city, most of which are administered by the Parks Department—the others being a charge of the Sanitary Department—few call for special comment. Mention may be made, however, of three, varying in character and

equipment, as showing difference of ideas in the laying-out of such places.

Phoenix Park.—The acquisition in 1893 of the site, extending to about $2\frac{1}{2}$ acres, of the Old Phoenix Foundry by the Corporation was a notable event in the history of its Health Department, as it marked the beginning of that department's work in providing open spaces in densely-congested districts. Much public interest was manifested in the work and in the equipment of the place. Local gentlemen provided a bandstand and an ornamental fountain, while trees and shrubs were planted around the margins. The place, however, was not protected by an unclimbable fence, with the result that the shrubs soon disappeared, and now only a few of the larger-growing trees exist.

Govanhill Grounds.—In comparison, in 1894, the site of an old brick-field, extending to about 4 acres, in the Govanhill district, was acquired by the Parks Department and laid out on quite different lines. It was enclosed with an unclimbable fence, with the result that hardly a tree has been injured, and the majority are vigorous-looking and twenty feet high on an average. Of all the open spaces in the city it commends itself to strangers visiting the city and studying the question of open spaces.

The third is the *Balgray Pleasure Ground*, in the north-east or Springburn district of the city. This was occupied by a number of small half-slum houses, as well as a fairly good modern tenement, all of which were purchased and the area cleared and laid out at the expense of Mr. HUGH REID, LL.D., the senior member of a most generous family, who wanted the children of that populous district to have a playground within easy reach. It is admirably equipped with the most modern type of appliances suited for young children. The area does not admit of games such as football, but provision is made for old men in the shape of smoking and reading rooms. This place is also enclosed with a suitable railing, with the result that the trees and shrubs are undamaged and thriving well, adding much to the interest of the place, which in itself has improved the amenity of the district in no small degree.

RECENT GIFTS.

Before closing mention must be made of recent gifts by generous landowners. In 1914 Lord GLENCONNER gave $13\frac{1}{2}$ acres of land to form a recreation park in the densely-populated and smoky district of St. Rollox. This will be laid out chiefly in football pitches, along with bowling-greens and gymnastic appliances for children.

In the Newlands district $13\frac{1}{2}$ acres were given by Sir JOHN STIRLING MAXWELL of Pollok for parks purposes, but the area has been temporarily laid out in garden allotments. It is expected that by 1920 operations to lay out the park will be commenced.

Another gift of 13 acres has recently been made by Sir JOHN

STIRLING MAXWELL to increase the small park of Greenbank, in the Pollokshaws district. This is to be entirely laid out for games, to meet the necessities of the rising generation of a growing residential district, as well as those of the old burgh of Pollokshaws. Meanwhile, it also is under garden allotments and agriculture.

Within the past month an area of 6 acres has been given by Sir ARCHIBALD CAMPBELL of Garscube to form a playground and recreation centre at Temple, in the north-west district of the city, which has also a growing population.

PLANTS.

Regarding trees and shrubs, visitors and citizens, as well as strangers, frequently remark on the absence from our parks of certain species of trees and shrubs. Apart from the vagaries of climate, the geological and physical conditions of the locality require to be considered. Though the annual rainfall is fairly heavy, averaging nearly 40 inches, that would not be a serious objection were the natural soil of a free gravelly nature, but unfortunately much of the soil in the district is boulder clay, through which water percolates slowly, and therefore the soil is naturally cold. Consequently it is unsuitable for many beautiful species of trees and shrubs; while in addition there is the smoke-fiend, common in all crowded areas, but intensified an hundredfold in a busy manufacturing city by the multifarious emanations from its various works chemical and mechanical, which poison and destroy all but the hardiest forms of plant-life. Our soot deposit is 200 tons per square kilometre per annum. Under such adverse conditions it is obvious that care and discrimination are very necessary in the selection of trees and shrubs to suit the exigencies of the situation. The list which will be given is somewhat meagre considering the vast amount of interesting trees and shrubs in cultivation in this country. It is one, however, based on close observation and study of the subject. Generally speaking, deciduous trees and shrubs are the most suitable, and a larger selection can be made from that class. The difficulty is, however, great in regard to evergreens. No large-growing evergreen trees are available, as none of the fir and pine tribe will thrive amidst the smoke and dirt of the city. A few of the smaller-growing species may exist for a time, but by no stretch of imagination can they be said to succeed. Our best evergreen shrubs are those which have smooth convex-shaped leaves, such as all broad-leaved hollies of the Hodgins class, Aucubas, Rhododendrons of the *calawbiense* type, and smooth-leaved plants generally, excluding, however, common and Portugal laurels, which are not good smoke-resisters nor suitable for wind-swept places. To widen the field of selection, experiments have been made by planting a wide variety of species under diverse conditions, and valuable lessons have resulted therefrom.

Turning from the higher to the more lowly, nearly all herbaceous

plants succeed, at any rate sufficiently to produce something of interest during nine months of the year at least, in comparison with the four months of the ordinary summer bedding plants—a fact which the public seem to appreciate very fully.

Allusion must also be made to a phase of horticulture which is somewhat uncommon in public parks, but which is a unique feature in those of Glasgow, and that is the number of winter gardens and glass-houses in which are cultivated good general collections of pot plants. Apart from the splendid ranges of glass-houses at the Botanic Gardens, there are conservatories or winter gardens in Glasgow Green, Tollcross, Springburn, and Queen's Park, all open daily to the public, whose appreciation may be gauged by the attendances. For example, one year when the Chrysanthemums were in bloom at Queen's Park, a census was taken of the visitors on a Sunday, and the number was over 7,000 within four hours. The houses at Camphill, in Queen's Park, were primarily intended as a propagating centre for plants to supply the newer parks, as well as for decorating the City Chambers on the occasion of civic functions, but owing to the interest shown in these houses by the public it was decided to open them daily from 12 till 5 p.m., and the results have fully justified the action.

Amongst the large number of ordinary decorative plants cultivated, the Department have gradually gathered a good representative collection of Orchids, which have proved a feature extremely interesting to, and appreciated by, the public, and a matter of surprise to strangers. We grow about 10,000 *Odontoglossums*, *Cypripediums*, *Dendrobiums*, and other genera. The first two named we find the most useful for our purposes, and less liable to suffer from fogs than *Cattleyas*, *Laelias*, &c.

MUSIC.

Provision is made for music during the summer months in all the principal parks, as well as in a few of the smaller. Eighteen of the parks and open spaces are provided with bandstands. The old idea that a bandstand should be perched on some eminence or made an outstanding architectural feature has been abandoned, and our newer erections are built to meet the views of musical experts—with, on the whole, fairly satisfactory results. In previous years, prior to the War, 390 performances were annually given throughout the parks.

A few years ago a new development, in the way of musical entertainments, was made by the engaging of concert parties, who give two concerts daily in certain parks. Whatever opinion may be held as to the wisdom or propriety of such performances being given in public parks by municipal authorities, there is no doubt, judging from the attendances, that a section of the public seem to enjoy them. The latest innovation is that of Sunday afternoon concerts

in the principal parks and in the winter gardens at Glasgow Green, and here again, judging by the attendances, the public appreciate the performances.

While local bands supply the majority of performances, the Corporation engage some of the leading military bands from London, as well as other noted bands in England. By Act of Parliament the Corporation can spend up to £4,000 a year on music.

RECREATIONS.

The increasing demand for means of outdoor recreation and amusement in the public parks has received much serious and careful consideration from the Committee of Management. The tendency is towards more and larger areas for active games, especially football. Unfortunately, the devotees of that most excellent game are not always sportsmen, and their actions and language are frequently objectionable; while the amenities of a park are very materially affected by an excess of football play. Why there should be more undesirable features connected with the playing of football than in other games has always been to me a puzzling question. The same cannot be said of cricket, golf, or hockey, though all require large areas for play. The restricted areas required for croquet, tennis, and bowling are much more easily met.

In regard to football, provision has been made for fifty-two pitches. For cricket, which is not such a popular game in Scotland as football, there are six pitches in four parks only. On the other hand, bowling is extremely popular, and thirty-eight greens are distributed in fifteen parks. Tennis courts are provided in several, but the demand is limited, while for croquet it is even less.

One feature peculiar to the west of Scotland is the provision of ponds in public parks for the sailing of model yachts, and seven of our parks are equipped with these.

As the shipbuilding industry is one of supreme importance on the Clyde, the sailing of yachts for pleasure or racing was in pre-war days one of the most popular recreations during the summer months. The desire to sail model yachts is a reflex of the sport by those who are unable to enjoy the full-fledged game, and consequently many artisans build model yachts to scale and sail them in the ponds of our public parks, having regular clubs who hold regattas and race their boats for prizes. The small boy has not, therefore, got it all his own way with the ponds. All games are under regulation, as the aim is to give every section of the community a fair share of enjoyment in their own particular sport. Unfortunately we have not yet boating ponds, though we trust such will be provided in the near future.

Gymnastic appliances are provided in all parks to a greater or less extent, while a few possess well-equipped open-air gymnasia.

ARDGOIL ESTATE.

One cannot conclude this somewhat lengthy description of the public parks of the city without mentioning Ardgoil estate, extending to 14,740 acres, which was presented to the Corporation in 1906 by Mr. CAMERON CORBETT, now Lord ROWALLAN. This great gift, which comprises the ridge of hills between Loch Long and Loch Goil, and northward across Glencroe to the top of Ben Ime, is typical of much of the West Highland scenery, and is probably one of the wildest parts of the Cowal district of Argyllshire. The desire of the generous donor was to give the citizens of his native city a place whereon they could have every freedom, consistent with the preservation of the natural features of the situation. Its distance from Glasgow, some forty miles, no doubt detracts somewhat from its value as a place of public resort. While it was fairly well served by steamers during the summer months prior to the War, since the outbreak of hostilities and the commandeering of the steamboats it has been practically isolated, as the miserable mail-boat was quite inadequate to cope with the traffic. The Corporation for several seasons before the War chartered a steamer, and gave the wives and children of the poorer classes an outing to their Highland estate. The estate is divided into four sheep farms. In 1913 a scheme of afforestation was inaugurated, and several hundred acres have already been planted with various coniferous trees. The prospects of success are such that at no distant date additional areas will be marked off for planting.

EDUCATIONAL GARDENS.

By JAMIESON B. HURRY, M.A., M.D., of Westfield, Reading.

THE Educational Garden is an essential adjunct to up-to-date teaching, and should be available for every town or country school. In rural districts the provision of the land required, which need not be extensive, should present no great difficulty, while in towns or cities suitable plots could generally be found in one of the parks or gardens belonging to the Public Authority. To what better use can a corner of such parks be put? In addition to promoting health and recreation they would then become a valuable aid to instruction.

The advantages to be derived from Educational Gardens may be grouped under three headings, although an indefinite number of combinations may be arranged. Such gardens may be used as a means of instruction in (a) Horticulture; (b) Botany; (c) Industry and Commerce. The form of garden laid out will vary according to the special objects in view.

(a) Horticulture.

The central idea of the School Garden, as generally planned in connexion with elementary schools, is the teaching of simple horticulture, so that boys and girls may be familiarized with the principles and practice of gardening. The requirements of a cottage garden, including the cultivation of the common vegetables and flowers, are kept in the foreground. The preparation and manuring of the land, the selection of seeds, the details of planting and watering, the grafting and pruning of trees, the gathering and preservation of vegetables, fruit and seeds, the destruction of pests and so forth are all carried out by the children under skilled supervision, every effort being made to encourage individual taste and experiment.

The fresh-air occupation thus provided, although valuable to all, will be found specially suited to certain classes of children who take more kindly to manual than to book work. They are unfitted for dealing with abstract ideas, but make progress when face to face with concrete objects and subjects. Other children may be pre-disposed to tuberculosis and need an extra amount of open-air life if they are to grow up robust. Further, the moral and mental training associated with such an occupation as horticulture will be found beneficial in a high degree, and serve as an introduction to work on the land in future years. The powers of observation are stimulated, and a taste for rural life and occupations is cultivated.

Great progress has been made during recent years in the teaching of horticulture in evening schools, in combination with some practical work in school gardens. Such evening classes are attended by older

children, to whom more advanced instruction can be given. The utilitarian aspect is also kept in view, the children being encouraged to earn some money by means of the produce raised in the gardens or allotments. Moreover, it must never be forgotten that development of the brain proceeds *pari passu* with increasing agility of the muscles.

In secondary schools many of the same principles may be aimed at as in the public elementary schools, although the decorative side of the garden as opposed to its purely economic aspect receives greater consideration. Infinite variety of management will suggest itself to the instructor with imagination. KIPLING'S poem "The Glory of the Garden" will open children's eyes to the romance associated with even a child's plot of flowers and vegetables.

A number of excellent manuals have been published giving full details as to the management of gardens in which the teaching of elementary horticulture is the main object in view.

(b) *Botany.*

The School Garden may also be planned to subserve the teaching of botany, and will go far to give life and interest to that science. Plots may be laid out so as to illustrate the natural orders of the vegetable kingdom, excursions being organized in search of plants required to fill gaps. With the garden may be associated an herbarium in which are preserved specimens for use during the winter months when Nature is resting.

Such a garden will provide a regular supply of plants for dissection and illustration, thus promoting the habit of personal examination of plants in lieu of reliance on second-hand authority, as represented by the printed book and picture.

The fundamental phenomena of vegetable physiology form an admirable introduction to those of animal, including human, physiology, throwing a flood of light on such problems as growth, circulation, respiration, digestion, nutrition, and reproduction.

Incidentally such a botanical garden will also help to illustrate principles of geology, of climate, of meteorology, of plant distribution, and so forth.

(c) *Industry and Commerce.*

Lastly, an Educational Garden may be used for giving instruction in the principal plants used in industry and commerce. This suggestion is somewhat novel, and may therefore be described in greater detail. Moreover, this form of Educational Garden has been in actual operation for several years and may, therefore, be said to have passed the experimental stage.

A brief account of the scheme as carried out at Westfield, Reading, may be of interest. The object in view is to give the public, especially teachers and children, an opportunity to study some of the more important plants used in industry and commerce. The scheme comprises four sections.

(1) *The Economic Border* is a long border, in which are arranged a number of plots containing several series of economic plants. Series I. includes plants that supply medicines, *e.g.*, opium poppy, belladonna, liquorice, hemlock, henbane, cinchona, castor-oil, aconite, eucalyptus, turpentine, valerian, jalap, podophyllum, rhubarb, Indian hemp. Series II. includes plants that supply foods, *e.g.*, rice, sugarcane, sugar-beet, millet, pepper, lentil, mustard, olive, arrowroot, cardamom, maize, monkey-nuts. Series III. includes plants that supply fibre, *e.g.*, jute, cotton, flax, hemp, mallow, ramie, papyrus, New Zealand flax, sisal hemp. Series IV. includes plants that supply dyes, *e.g.*, annatto, woad, indigo, madder, turmeric, sumach, weld, dyers' buckthorn.

Some of these plants are quite hardy and live out of doors all the year round. Others must be kept in a heated conservatory during an English winter, and be planted out in a sheltered border during the summer.

(2) *The Economic Conservatory*.—In this grow a variety of plants which are too delicate to be grown in the open air, *e.g.*, tea, coffee, ginger, guava, custard-apple, banana, date palm, oil palm, pine-apple, vanilla.

(3) *The Old English Herbarium*.—This consists of a series of plots in which are arranged about sixty herbs cultivated in medieval English gardens. Many of these herbs are mentioned by Shakespeare, Chaucer, Spenser, and other early writers, and were used for homely remedies, or for pottage, sauce, salad, or scent. This section will be full of interest in connexion with English literature as well as medieval home life and customs. A glance at such a volume as ELLACOMBE'S "Plant-lore and Garden-craft of Shakespeare" will at once suggest practical applications of such a herb garden in education.

The following is a list of the herbs grown at Reading:

Alecost.	Elecampane.	Samphire.
Angelica.	Fennel.	Savory, summer.
Aniseed.	Feverfew.	Savory, winter.
Arnica.	Golden Rod.	Sea Holly.
Asarabacca.	Horehound.	Skirrets.
Balm, common.	Horse-radish.	Sneezewort.
Balm of Gilead.	Hyssop.	Soapwort.
Basil, bush.	Lavender, purple.	Solomon's Seal.
Basil, sweet.	Lavender, white.	Sorrel.
Bergamot.	Mallow.	Southernwood.
Borage.	Marigold.	Spikenard.
Burdock.	Marjoram, pot.	Sweet Cicely.
Burnet.	Marjoram, sweet.	Sweet Flag.
Caper Spurge.	Mint.	Sweet Maudlin.
Caraway.	Mugwort.	Tansy.
Cardoon.	Mullein.	Tarragon.
Cat Mint.	Musk.	Thrift.
Chamomile.	Orache.	Thyme, common.
Chervil.	Parsley.	Thyme, lemon.
Chives.	Pennyroyal.	Thyme, purple.
Clary.	Peppermint.	Thyme, silver.
Comfrey.	Purslane.	Thyme, woolly.
Coriander.	Rosemary.	Valerian, red.
Cotton lavender.	Rue.	Verbena, lemon-scented.
Cumin.	Sage, common.	Vervain.
Dill.	Sage, purple.	Wormwood.

(4) *The Economic Museum.*—This is a large room in which are exhibited various commercial products yielded by plants grown in the Economic Border and Conservatory, with the object of teaching children to associate economic products with the plants from which they are obtained.

Thus opium, liquorice, eucalyptus, castor-oil, quinine, rhubarb, belladonna, turpentine illustrate some of the products of the medicinal plants. Rice, arrowroot, cane-sugar, beet-sugar, mustard, pepper, lentils, corn-flour, olives, monkey-nuts illustrate some products of the food-plants. Flax, cotton, ramie, jute, hemp, *Phormium tenax*, sisal hemp illustrate the products of fibre-yielding plants; while various pigments such as annatto, turmeric, woad, indigo, madder, fustic, weld, buckthorn render a similar service for the dye-yielding plants. In every case detailed descriptive labels are attached so that the exhibits are made as educational as possible.

The Educational Garden, with its Conservatory and Economic Museum, is thrown open to the public on several half-holidays, including Sunday, during the summer, and has been visited by many thousands of teachers and school-children as well as by the public, who seem to appreciate the somewhat novel educational opportunities provided. Indeed, both teachers and pupils often bring note-books as an aid to future study.

The scheme here described in detail has been carried out in a private garden, and the experiment seems to have been justified by its success. But if the scheme is deserving of a wider trial, a more permanent and public basis is desirable.

In many cases schools already have land attached to them which might be utilized for some portions of the arrangement suggested above. A humble beginning may be gradually developed until a most interesting Educational Garden has been established.

Our public Education Committees could facilitate the provision of such Educational Gardens by allocating one of the gardens under their control. In the case of towns a single plot of ground illustrating economic and industrial botany would probably suffice, as it could be visited by the pupils from a number of schools, and would also supply them with the necessary specimens for dissection and study.

A third possibility lies in the provision of Educational Gardens by our Municipal Authorities in one of the parks or gardens which they control. Such parks and gardens are already of priceless value to the community as sources of health, recreation, and refreshment. By the addition of such an educational section they would add yet another benefit to those they already provide.

A Catalogue has been printed for the use of visitors to the Reading garden, and will be sent gratis to any public authority interested in the scheme on application to me.

CONFERENCE ON FRUIT-GROWING.

At R.H.S. Spring Meeting at Chelsea, May 21, 1919.

[The Conference was under the joint auspices of the Royal Horticultural Society and the Chamber of Horticulture. The Chair was occupied by Mr. GEORGE MONRO, jun., and there was a large and attentive audience.]

THE CHAIRMAN, in opening the proceedings, said: We thought it a good opportunity on the occasion of the Chelsea Show, when almost every grower and cultivator interested in horticulture is present in London, to have a Conference on a subject to which some of us attach considerable importance, viz. "the increase of the supply of home-grown fruit," possibly at the expense of decreasing foreign imports. One of the biggest questions we have ahead of us in the future, in view of the financial state of the country as the result of the war, is to produce as much as possible ourselves, and to import as little as possible. This afternoon addresses will be given by four speakers, each of whom will speak about the subject from a different point of view, and after they have finished the meeting will be open for general discussion. We propose to limit the four speakers as nearly as possible to ten minutes each, and in the general discussion I propose to limit the speakers to five minutes each. You will be able to say a good deal in five minutes, and I should like every speaker in the audience to give his name before addressing the meeting. I will now ask Mr. W. LOBJOIT to open the discussion, and he will speak more particularly in regard to distribution.

THE DISTRIBUTION OF FRUIT.

At first sight it may appear that distribution has but a small place in any discussion of methods to increase the supply of fruit. It may be said that the proverb, "First catch your hare before you jug her," applies. On second thoughts, however, it will appear that to produce fruit on a plantation is not the same as to produce it upon the consumer's table. That if the second operation is not possible without the first, the first is, to say the least, incomplete without the second; that, so far as the consumer is concerned, the second is of equal importance with the first. For little is he benefited if the strawberries make lines of luscious scarlet on the fertile wealds of Kent or the sun-warmed slopes of Hampshire, or if the plums bear down the laden limbs of the trees in Worcestershire or Middlesex, or the apple-trees of Hereford and Cambridge make gold and scarlet landscapes, if means exist not for forging up the chain of contact between him and the produce itself. It may also be said that the main proposition

deploys on two lines, viz. that the fruit must be put upon the consumer's table with the smallest loss possible of freshness and natural bloom; and that those who perform any service in the chain of transportation between grower and consumer must have what is fair, and only what is fair, for the service each renders, while the route must be protected from every highwayman-like claim without necessary service rendered; so that the step up between the cost as the fruit leaves the grower and that at which it touches the palate of the eater shall be natural and reasonable because composed of only necessary accretions.

Thus to state the problem is simple enough. To state also, that, except in some special cases, neither of the desiderata of efficient distribution is in fact accomplished, is to run little risk of having to meet serious opposition. To indicate the manner in which efficient distribution can be achieved—or at least how the existing standard can be improved—is neither simple nor free from controversial risks. Yet this, without doubt, is the object of the discussion upon which we are now embarked.

There are four lines of contact between the fruit-grower and the fruit-eater at the present moment in operation. Beginning with the longest and least direct and finishing with the shortest and direct, they are: (1) The grower—the local railway station—the railway terminus—the market salesman—the retailer—the eater. (2) The grower—the market—the retailer—the eater. (3) The grower—the retailer—the eater. (4) The grower—the eater.

The amount of fruit passing along these lines is greatest in the case of the first, and decreases with each line to the fourth. Between the first and second links in the first line, and the second and third links in the second, there are sometimes inserted links—of the "stand and deliver" type—in the shape of speculators, who perform no necessary service—and the result of whose operations is frequently to increase the cost on the table. In the first it is by buying up large quantities from the grower *in situ*—and so creating some measure of a corner—an operation possible only in years of short supply; in the second by buying up upon the market a large enough proportion of any morning's supply to create a corner for that morning—an operation that, under certain conditions, may be effected even in a year of bountiful supply. The first class of speculation would become more frequently possible with a tariff or restriction of imports, but might result in what would have gone wholly to the grower being shared by the grower and the speculative spider into whose web the grower had walked, and therefore in little if any increase of price to the eater. The second is seldom practised upon salesmen who are always upon the market and who are, or ought to be, "up to" the latest price fluctuations, but is frequently successful in the case of growers who sell their own produce, who come straight from their plantations to the market, and who do not "tumble to what is wanted" until too late. Here the effect may sometimes be that the speculator

and the retailer share what would have been the retailer's profit, and the eater suffers little if any increase of cost; more often, however, it is this last who has to pay for the speculator's little game.

Now it will be agreed that the *fourth* line—that of *grower* and *eater* in direct contact—is the ideal. It will also be agreed that along this line a smaller quantity passes than along either of the three other lines. There are no statistics existing to prove this; the assertion must remain an assertion based upon what is called "common knowledge," and in this state of nakedness it must stand the assault of those who, rightly, demand conclusions based upon statistics.

It is probably this line of direct contact that is in the mind of those whose one prescription for defects of distribution seems to be elimination of the "middle man," or sometimes the variant—"the unnecessary middle man."

A little consideration will make it evident that this line of distribution can never apply to more than a relatively small quantity of produce, and that only where certain clearly defined local conditions obtain. There must be just enough of orders as produce to dispose of, and just as much produce as orders to be satisfied; or else some orders are left unfulfilled, or, on the other hand, some produce is wanting customers. Moreover, the quality must be maintained at the desired level from day to day. Now, everyone with practical knowledge knows that these several conditions never run long together. An association of growers in co-operation may secure their fulfilment over a longer period than any single grower. But sooner or later the eater finds he must draw his supplies from a wider range; and always the grower has grades of produce that he must send to a mart for disposal. A great enthusiasm has more than once been excited by the idea of postal supply direct from grower to eater. If there had been half the advantages in the system claimed for it, there has been time enough for it to have overspread the land.

That each boom has had a hectic popularity of a few months, and then died back to the normal trickle, is evidence enough that it is calculated to meet the convenience of a few only.

When I was a boy, along the broad road from Hammersmith Bridge to the "Red Lion" there was on each side a fringe of gardens where strawberries were skilfully cultivated. Upon any day in the strawberry season, lines of carriages might be seen, whose occupants had come out from fashionable London to secure fresh-gathered fruit for dessert. This affords an illustration of the conditions under which direct contact between grower and eater is possible—and it gives clear indication how narrow those conditions are.

The line *grower*—~~retailer~~—*eater* is a line of contact which, so far as it can be utilized, gives the eater good promise of receiving the produce in a condition of natural freshness. With the development of motor transport, and the association of growers in distributive units—that the pressure of circumstances and the result of enlightened outlook may lead one to hope for—this line of contact is capable of

considerable extension. It can never, however, account for more than a part of the problem of distribution.

The average English housewife draws her daily supplies from a wide area of the earth's surface. She cannot be restricted to part of a county—nor to one county—nor to one country—nor to one continent. That is why she needs a retailer to supply her wants. That is why the retailer must have a market at which he can find, concentrated, produce from every producing zone.

The line *grower—market—retailer—eater* accounts for a larger part of the produce than either of the two last under consideration.

It is chiefly restricted to produce grown near enough to market to be road-borne direct from the grower's premises to the market. It ought to ensure that the produce reaches the eater without too much handling. It must have occurred to our forefathers in very early times, and long satisfied all requirements.

As practised to-day, however, it has serious drawbacks. If one considers what the possibilities are from organization one may say that the eater has a right to demand more attention to his desires than this crude system—or want of it—generally gives him. In the first place, it assumes that every grower is a salesman, which is far from the case. In the next it results in produce being put upon the markets in almost infinite degrees of grading, packing, or absence of either or both, besides taking numbers of men from their holdings to do what, with organization, one or two could do better.

When all is said, the line the *grower—the local railway station—the railway terminus—the market salesman—the retailer—the eater* is that along which the bulk of the fruit crop must travel. Nor is it easy to see how any of the links can be cut out to shorten the chain. Are we then living in the best of all worlds? Is there no opening for improvement? Everyone who has examined the question will agree that there is ample scope. Where, then, can improvement be sought? There are three avenues of approach. They rest with the *grower—the railway—the salesman*. With the *grower* it rests to associate for securing established standards of grading and packing, and for placing produce upon the railway in bulk at convenient centres for entraining. If each fruit-growing centre had its distinctive grade and mark, how the work of the salesman would be simplified, and how much better the returns to the individual grower would be! How is it possible for the salesman to do justice to every sender of ungraded, ill-packed little cotechs of produce—some of which must inevitably get "on show" after the cream of the market has been skimmed off? The retailer and the eater together have just reason to condemn sixteenth-century methods in this wide-awake twentieth century.

The grading and packing installations could be established as in America, close to the forwarding station on the railway, so that there need be no additional carting.

With the *railway* there should be properly constructed wagons—preferably with transferable containers, so that goods could be

transhipped from rail on to motor wagon for conveyance to market salesman without rehandling. With produce bulked and ready at the forwarding stations, trains could be run at times convenient for the proper dealing with the produce, and loss from late arrivals should be rare occurrences.

The scales of rates should be radically revised. The whole community has just reason to complain of the present antiquated classification—which dates from the time, when—for instance—tomatoes were a curiosity and no imagination pictured them in tons. The unjust conditions of the owner's risk rate, which free the railway companies of the ordinary carrier's responsibility, should be amended in favour of a reasonable charge and reasonable conditions comparable to the service demanded of the company, and imposing upon them and their servants responsibility—not for wilful negligence only—which can never be proved—but for culpable carelessness also.

In times of "glut" special low rates should be put in force for produce loaded in bulk, so that the consumer shall not be cheated of his share in Nature's bounty because it will not pay to send the fruit to market. Doubtless the railways perform a public service when special trains are organized to convey the patrons of the Turf to the race meetings. Would it be any less of a public service if the running of special fast trains for conveyance of fruit and vegetables were developed?

Much fruit would be saved from waste in times of glut if arrangements were made for delivering direct to the jam-boiler.

From the *salesman* there must be demanded an effort to meet the difficulties of the retailer, which hinder the distribution of produce, especially in periods of great plenty.

Let anyone consider the position of the retailer. His wares are of the most perishable character. To overbuy in any article may mean loss, cancelling the earnings of a whole day. To get his wares home, he must get up in the small hours of the morning—go to market with his own conveyance and carry back his own purchases. Compare this with the case of, say, the draper. His wares are not perishable, except from the exigencies of fashion; they are brought by direct delivery or carrier; if the demand for his goods increases, he can telephone to his wholesaler for fresh supplies. Can it be marvelled at that under present conditions, at times of great plenty—when the percentage of profit is a small margin, the public do not reap the full benefit? Adding all the handicaps—unorganized growers, small accommodation between grower and railway, unfair rates, uncertain deliveries, the temptations to the retailer to make his profit by handling the minimum quantity of produce—would it be wonderful if some truth existed in the stories read in newspapers of fruit ungathered—lying rotting—because it would not pay to forward it?

The *salesman*, besides securing modernizing of market arrangements for receiving and forwarding produce—must organize deliveries

direct to retailers at any hour of the day. By this means the packing of the business into a few early morning hours would be modified. Stuff coming into the market late in the day might go at once to the retailer without having to wait until next morning's market. The retailer would be led to adopt a less cautious policy and would handle a greater bulk of stuff. If the use of the telephone became general among growers, it would enable the salesman to keep in touch and advise them as to forwarding produce. A grading and packing expert might be sent by the salesman to instruct and advise the back numbers among his clients.

But for the grower the spirit of the times is shouting that salvation lies only in combination and co-operation. He that hath ears to hear, let him hear.

The CHAIRMAN then called upon Mr. F. SMITH for his paper on

VARIETIES FOR MARKET AND FOR PRIVATE GARDENS.

I have been asked to give you a list of the useful varieties of fruit to plant, in order to increase the home-grown supplies. I can strongly recommend from personal experience the varieties I shall name as reliable market sorts. Intending planters must not trust blindly to any given list of varieties, but find out those which do well in their own particular districts and make them their main crop. Some of the varieties I recommend may not be suited to all soils.

I will begin with kitchen apples, which must be large in order to please the cook and the many who say with the miners that they want something big enough to put a bit of crust round. The trees should be free croppers, and the least susceptible to disease. I think the best are as follows:—'Early Victoria,' 'Grenadier,' 'Stirling Castle' (this objects to sprays containing sulphur), 'Lord Derby,' 'Lane's Prince Albert' (best as a dwarf), 'Norfolk Beauty,' 'Bramley's Seedling,' 'Newton Wonder' (this will not stand sulphur in any form).

I now come to dessert apples. There is a large field here for the hybridizer, because we have very few commercial apples which have quality, colour, and a good constitution. Our raisers of new apples cannot get away from 'Cox's Orange' as one parent, but it is far too delicate. What is badly wanted is something to compete with American apples from December to the end of March, when Australian fruit comes in, and I believe this can be got if our specialists will give it their attention. The varieties I recommend are 'Gladstone,' a very old variety from Warwickshire, which does best on 'Paradise Stock.' I had grafts of this forty years ago from a tree about one hundred years old. Then there is 'Beauty of Bath' (on 'Paradise'), also 'Worcester,' 'Rival,' 'Allington,' and 'James Grieve.'

With regard to pears I would mention 'Fertility,' 'Doctor Jules Guyot,' 'Conference'; and 'Windsor Wonder' for grafting on any variety that does not succeed. It is a fairly good stewing pear, and a great cropper.

Plums :—' Rivers' Early,' crops well on grass, but not on cultivated ground ; ' Czar,' ' Purple Egg-Plum,' ' Victoria,' ' Veitch's Black Bullace' (' Langley Bullace'), which is first-rate for bottling.

Gooseberries :—' May Duke,' which was grown in Kent fifty years ago as ' Bank of England'—it does not do under trees, but is good in the open ; ' Careless,' ' White Lion,' and ' Lancashire Lad.'

Black currants :—' Baldwin,' ' Seabrook's Black,' ' French.'

Red currants :—' Skinner's Early,' ' Dutch' (of upright growth), and ' Raby Castle.' I should like to mention, however, that there is great confusion in the names of red currants, because they are different in different parts of the country.

Raspberries :—' Bath's Perfection,' ' Hornet,' ' Pine's Royal.'

Strawberries :—' Royal Sovereign,' and ' Stirling Castle' for jam.

Loganberries do well on the American system of training, but must not be raised from seed, otherwise you get all kinds of varieties.

Cherries :—' Early Rivers,' ' Waterloo,' ' Kentish Bigarreau,' ' Napoleon,' ' Kentish,' and if you have a spare corner Quince 'Champion' is good.

I was horrified to find upon coming here this afternoon that I was supposed to give a list of garden varieties, and as I was not warned in time I have not prepared any list. However, I have jotted down a few since I have been here.

Dessert Apples :—' Miller's Seedling,' ' Benoni,' ' Cox's Orange Pippin,' ' Charles Ross,' and ' Sturmer' (very late).

Pears :—' Louise Bonne of Jersey,' ' Doyenné du Comice.'

Plums :—' Green Gage,' ' Jefferson.'

Gooseberries :—' Yellow Rough,' and ' Warrington' (for bottling).

Raspberries :—' Superlative.'

That is my list, but if I had received longer notice I would have given you the names of other good garden varieties. It is a most difficult subject, however, and it is particularly desirable that intending growers should find out, each in his own district, which varieties will there do best.

The CHAIRMAN then called upon Prof. E. S. SALMON, Mycologist to the South-Eastern Agricultural College, to read his paper on

THE GROWING OF CLEAN FRUIT.

I have been asked to speak on the subject of the "growing of clean fruit," in other words, on the control of those fungus and insect pests against which the fruit-grower has to wage such a ceaseless warfare.

In reviewing this subject, it will be convenient for us to consider it under four heads :

1. Breeding ;
2. Planting and cultivation ;
3. Direct measures other than spraying ;
4. Spraying.

I. CONTROL OF DISEASE BY BREEDING.

More attention should be paid to the breeding of varieties which are immune or resistant to those diseases which are apt to ruin the crop.

It may not be generally realized what great differences of "constitution" exist in the forms or varieties of one species of plant. Let me give you the facts which I have recently observed in the case of the hop plant and its mildew (*Sphaerotheca Humuli*). I obtained seed of the "wild hop" from Italy, and during the past six years I have raised some 600 seedlings, and tested their susceptibility to mildew. The greater number of these seedlings have proved extremely susceptible to mildew; a small number are strongly resistant or semi-immune, to the mildew, so that they suffer little harm from its attacks; and a small number are absolutely immune to mildew. These seedlings do not shift from one class to another in different seasons, but remain perfectly true to their "constitution" from year to year.

This year, I am testing the commercial varieties of hops in cultivation, and so far it does not appear that any of these were selected originally for any resistance to mildew.

And this is the first point which I wish to emphasize: that more attention should be paid at the very start to combating disease; this can be done by the selection of varieties resistant to disease.

With our present knowledge of the principles of heredity, we have every reason to believe that the character of disease-resistance can be, by the process of hybridization, united to the other desirable characters.

This work of breeding disease-resistant varieties is scarcely one, I think, which the ordinary nurseryman can carry out, because it requires the particular disease against which resistance is sought to be always present in a virulent form—which is not a nice prospect for a nursery!

Research institutions should be deputed to deal with the breeding or testing of plants against particular diseases; here the work would be carried out under specialists who have an intimate knowledge of the diseases in question.

We have new varieties of potatoes immune to "wart disease" being raised by State help, and similar breeding work is urgently required with regard to our various fruits.

It is possible that the different stocks used in growing apples, pears, plums, and cherries may affect their liability to disease. At the East Malling Fruit Experiment Station many different types of Paradise stocks have been collected, and it is intended to investigate the influence of each on the susceptibility to disease or otherwise of the grafted tree.

2. CONTROL OF DISEASE BY PLANTING AND CULTIVATION.

I must refer only very briefly to this part of the subject.

The *site* of fruit plantations should be carefully chosen with reference to the control of disease. Exposure to early or late frosts, or to excessive moisture, will encourage disease. Proximity to woodlands may bring on very bad attacks of caterpillar.

Over-crowding *must* be avoided. Good ventilation is as good as a good spraying. Gooseberry bushes, *e.g.*, must not be planted so close together that there is no room to walk round them to spray them against American Gooseberry-mildew.

Excessive nitrogenous manuring should be avoided.

3. CONTROL OF DISEASE BY DIRECT METHODS OTHER THAN SPRAYING.

This method of dealing with disease is far too often neglected, and I want to drive home this point with what emphasis I can.

Too many fruit-growers are inclined to rely *entirely* on spraying; whereas, good as spraying is against many insect and fungus diseases, it must be remembered that it is *entirely* useless against some of the worst pests.

I will cite instances of some fungus and insect diseases of this class:

"*Silver-leaf*" of *Victoria* (and other) *Plum-trees*.—This disease is caused by the fungus *Stereum purpureum*, which comes to the surface of the stem (or branch) *when the tree (or branch) is dead*, and forms there myriads of its *spores*, which spread the disease to surrounding *Plum-trees*. Every tree killed by Silver-leaf and allowed to remain in the garden or plantation is a most prolific source of infection. We could *prevent* Silver-leaf if an order could be carried out for the grubbing up and burning of "silvered" trees.

Many a fruit-grower has remarked to me—"No cure known for 'Silver-leaf,' I suppose?"—and continues to leave the dead trees to propagate the disease. Well—perhaps, a Joint Committee of the R.H.S. and the Chamber of Horticulture will one day deal with such offenders!

Apple "canker" is in the same class; spraying is of no use, and the knife is the remedy in cutting out the cankers: or, in really bad cases, top-grafting with strong-growing canker-resistant varieties—such as 'Bramley's Seedling' or 'Newton Wonder'—must be employed.

I should like to refer here to the 'Brown Rot' canker which has attacked recently the variety 'Lord Derby' with such virulence. Through the very thorough work of Mr. H. WORMALD, my assistant at Wye College, we know now that a particular strain of the "Brown Rot" fungus (*Monilia cinerea*) is responsible for the blossom wilt and canker of 'Lord Derby' and of a few other varieties of apples. Cutting off the wilted blossom spurs as soon as attacked, and cutting

out the cankers *before the tree flowers*, if thoroughly done, leaves the tree healthy again, and is a practicable way of dealing with this very destructive disease. By adopting this measure, owners of young Derby trees can most certainly keep the disease under at slight cost; where old trees have been attacked for several seasons and nothing has been done, then top-grafting has probably to be recommended.

Among insect diseases, the following instances have been given me by Prof. F. V. THEOBALD.

Certain caterpillars can be dealt with in the egg stage. The egg-rings (on the current year's growth) of the Lackey-moth, and the egg-masses of the Vapourer-moth, can be collected by hand.

"Grease-banding" against the Winter-moth is also an important adjunct to spraying.

The grubs of the Pear-midge are destroyed if poultry is kept among the trees.

The Strawberry Ground-beetle can be caught by means of "traps."

4. CONTROL OF DISEASE BY SPRAYING.

Lastly, we have the all-important subject of spraying to consider. Without spraying, the fruit-grower cannot hope to grow clean fruit.

Let us take the insecticides first.

It is encouraging to find that numerous discoveries and improvements have lately been made in the caterpillar washes. The arsenical washes have been improved and are in a fair way to be standardized. New and efficacious powders used in so-called "dry-spraying" have been discovered, and also pyridine.

The combined wash of nicotine and arsenic enables us to kill at the same time caterpillars and apple-sucker, and to some extent green-fly.

Prof. THEOBALD tells me that he believes that much good can be done by spraying *in the autumn* against the apple "green-fly," and that a heavy lime-wash used *late* in the spring is efficacious (through its mechanical action) against apple-sucker and apple-blossom weevil.

With regard to new or improved fungicides, here again the prospect is equally encouraging.

The most powerful fungicides known are those containing copper. Bordeaux mixture still holds its own as the most powerful fungicide against such diseases as apple-scab. Personally, I favour the mixture made with an excess of lime. I have seen the best results obtained with this, and I notice that the apple-growers of Nova Scotia are now using a Bordeaux mixture with a very great excess of lime, and claim for this mixture (which has been called "Thompson's Bordeaux Mixture") that it does not "scorch" the foliage nor "russet" the fruit as other more neutral Bordeaux mixtures do. Then we have the recently-discovered emulsion of copper sulphate and soap, which is safe for use on foliage. This has been used with good effect on potatoes, but has yet to be tried on fruit.

Against mildews, we have the ammonium polysulphide wash, discovered three years ago at Wye College. This wash, unlike lime-sulphur, leaves no visible deposit on the parts sprayed, and is therefore extremely useful for spraying gooseberries against the American Gooseberry-mildew when the fruit is to be picked soon.

Then we come to lime-sulphur—perhaps the most widely used of all fungicides. I have an interesting announcement to make with regard to this wash. As is well known, when lime-sulphur is used as a summer spray on foliage and fruit, it is very difficult, even when using a nozzle giving the finest "misty" spray, to get the wash distributed evenly over the surface of the sprayed parts; the deposit when dried is found to be "blotchy." Recent experiments carried out at Wye College show that this difficulty is entirely removed if a small quantity of saponin in solution is added to the lime-sulphur wash. If the lime-sulphur wash contains 0.05 per cent. saponin it will be found that the dried sediment is in the form of a practically continuous film over the sprayed surface. Soap—the usual spreading agent—cannot be added to lime-sulphur for chemical reasons, but by means of the addition of saponin we are able to improve greatly the spreading power of lime-sulphur, which should in consequence prove a better protective wash. Also, by the substitution of a thin film instead of "blotches," there is much less disfigurement of sprayed fruit.

Another point I should like to mention with regard to lime-sulphur concerns its composition. Our experiments have shown that the fungicidal properties of the ammonium polysulphide wash depend upon the polysulphides present. We are now investigating the action of the polysulphides of the lime-sulphur wash, and it is probable that the strength of lime-sulphur washes will be able to be determined on the basis of the percentage of its polysulphides. This will be a much more scientific basis for standardization than the present specific gravity test.

In concluding, I should like to express my opinion that the prospects of growing clean fruit in this country have never been so good as they are at the present time.

Fifteen years ago—when I joined the staff at Wye College—very little was being done in Kent to control fungus diseases. The cause of "black-spot" or "apple-scab," of "silver-leaf," and of "brown-rot," was quite unknown to the average grower; Bordeaux mixture was unknown except for use on potatoes; lime-sulphur had not been introduced from America; the nozzles in use were those employed for hop-washing and only suitable for the application of coarse sprays. At the present time we find both the farmer and his foreman using magnifying-glass to identify the fungus and insect pests; in several places in Kent we see platforms erected for the making of Bordeaux mixture from "stock solutions"; lime-sulphur is in common use, and many farmers understand the use of the hydrometer in connexion with its dilution; the spraying machines and the nozzles in use are equal to the best made in other countries.

The manufacturers of spray fluids are ready to take up new formulas as these are invented, and are themselves anxious to have the washes standardized on a scientific basis.

There are more scientific workers in the field, and, best of all, the practical man, the fruit-grower—be he farmer, gardener, or nursery-man—shows himself more and more anxious to take advantage of scientific advice and by its help to do his best to grow “more clean fruit.”

In the unavoidable absence of Mr. JAMES UDALE, of the County Experimental Garden, Droitwich, the Secretary of the Society, Rev. W. Wilks, M.A., V.M.H., then read Mr. UDALE's paper on

FRUIT GRADING.

Profitable fruit cultivation entails something more than cultivation only, even when this is of the best. The best varieties must replace the worn-out and out-of-date ones of each kind of fruit grown; and no effort must be spared to produce these superior varieties in the best possible condition.

But cultivation and selection of varieties are not sufficient: something more is required in these days. The fruit must be offered to the buyer in an honest and attractive form. Honest, by the upper layer or layers of fruit being really representative of the bulk; attractive, by judicious grading and careful packing. How is it possible for a prospective buyer to make a *fair* bid for the fruit if all qualities be mixed together, or if the reprehensible system known as “topping” be practised, no matter whether he be buying direct from the grower or through the medium of a salesman or commission agent? Therefore a grower who fails judiciously to grade his fruit before sending it to market is unfair to himself and his fruit, and in my opinion—based upon over thirty years' practical experience—he loses money on the annual fruit crops through this omission.

Unquestionably instances occur when a grower receives a number of sales accounts during a fruit season showing no appreciable difference between his first-grade and second-grade fruit; and the writer thinks he can find examples of this annually in his own books. On October 23, 1917, he sent ‘Cellini’ Apples in first grade and second grade to a salesman, and in return received 18s. per cwt. for the second grade and 16s. per cwt. for the first grade! Or here is an instance of ‘Catillac’ Pears, distinctly first grade and second grade, yet realizing 30s. per cwt. for the first and 28s. for the second.

Again, take ‘Pitmaston Duchess’ Pears, a bush growing in the open and producing 348 lb.; the prices realized in the open market were as follows: First grade, 28s. 9d.; second grade, 24s.; third grade, 20s. At first sight it appeared as though no appreciable advantage had been gained by the grading; but on reflection the thought was strongly borne in on me that if they had *not* been graded at all we would probably have received the third price, 20s., for the whole.

By way of contrast to the foregoing, I take 'Doyenné du Comice' Pear, from two bushes growing in the open, which produced 178 lb. For these the prices realized were 65s. per cwt. for the first grade and 37s. for the second grade.

One more illustration of prices for pears sold in the wholesale market: 'Durondeau,' a bush in the open, bearing 172 lb. These realized 32s. per cwt. for first grade and 20s. for second grade.

All these examples of prices, and any which may follow, were for fruit grown in 1917, the year of plenty, on the one hand, and of low prices on the other; and examples are taken from that year for those reasons. An example of apples for the same year is 'Worcester Pearmain.' Of these there was an abundant crop of good fruit. The first grade realized 27s. per cwt., the second grade, 23s. 6d.

Another example of pears is that of 'Doyenné Boussoch,' which shows a material difference between the return for the first grade and second grade. The fruit was from bush trees growing in the open, and the prices realized were 22s. per cwt. for the first grade and 13s. 1d. for the second grade.

'Annie Elizabeth' apple, grown in 1917 and sold April 12, 1918, realized for first grade, 95s. per cwt., and second grade 67s. Apple 'Schoolmaster,' grown in 1917 and sold on December 5, realized 22s. per cwt. for first grade and 11s. for second grade.

With the foregoing examples, and notwithstanding some disappointments, there can be very little doubt that it pays to grade fruit of nearly all kinds.

Many growers decline to grade their plums, and send them to market as they are gathered from the trees. In the case of common varieties there is frequently some justification for this; but occasionally there are distinctly better samples among the bulk which merit special treatment and which pay for the trouble. Choice-flavoured varieties and varieties striking to the eye for their great size should unquestionably be graded; and though the salesman may not *always* appreciate the distinction, he does so in many instances. But the consumers are not always infallible or discreet when making their purchases of fruit, and will frequently prefer the huge, flavourless, coarse 'Belle de Louvain' to a 'Purple Gage,' 'Coe's Golden Drop,' 'Old Green Gage,' or 'Jefferson.'

Currants, black, red, and white, are always worth grading; but how frequently is an otherwise good sample spoiled by the presence of a few small, ill-coloured, or almost dry fruit!

Raspberries also should be graded when necessary; but in this case grading is reduced to a minimum or rendered unnecessary if the varieties be sent to market in separate packages. For example, 'Bath's Perfection' should not be mixed with 'Superlative' or 'Hornet' or 'Norwich Wonder.' 'Prince of Wales'—old and forgotten though it be—is a prolific, good-flavoured, and good-looking raspberry, deserving to have its own basket.

Loganberries should not escape the attention of the grader. The

handsomest fruits merit separation from the less attractive, and will compensate the grower.

Ripe gooseberries, like raspberries, should be gathered and sent to market in their respective variety: 'Keepsake,' 'Lancashire Lad,' 'Crown Bob,' 'Early Kent,' 'Warrington,' 'Red Champagne,' 'Early Sulphur,' 'Whitesmith,' 'Whinham's Industry,' each by itself, commencing with 'Keepsake' and 'Early Kent' as green gooseberries. Small berries should be picked out and sold separately.

Apricots, nectarines, and peaches should be graded. What is there attractive in a tray of ungraded peaches or nectarines? The small fruits appear smaller than they really are; the larger fruits appear to be larger than they are, and the whole present an appearance less attractive than it should be. If possible, pack first, second, and third sizes by themselves in packages presenting no disadvantages; and if thereby their size is neither increased nor diminished, the small ones are not made to appear smaller by contrast with large fruits.

The matter of *contrast* in size applies with equal force to apples and pears and other fruits.

PEARS.

The pear has probably received more attention in the matter of grading than any other fruit, unless it be the strawberry, which has been graded by nearly all growers for many years.

Pears, unlike nearly all other hardy fruit, may be divided into three groups: those grown upon walls, on bushes, and trained trees in the garden, whether open or enclosed, and those grown in grass orchards. But the fruit from each group should receive consideration in the matter of grading. The finest pears are generally obtained from walls, and, if thinning and mulching have been practised, the majority of the finest pears will be of the first grade, the remainder will probably be good second grade. The same remark applies to the smaller varieties grown on walls, but these are seldom grown for sale, but for home consumption. Pears grown in the open, on bushes or on cordons, also produce many fruits of first and second grades, especially if they have been fed and thinned.

Sometimes, and in certain counties favourable for pears, a number of very beautiful fruits are produced in grass orchards, and these unquestionably deserve to be graded as firsts and seconds; the remainder generally being of third and fourth grades, with sometimes a fifth for the boy customers of the third- and fourth-rate fruit shops. Pears such as 'Doyenné du Comice,' 'Pitmaston Duchess,' 'Beurré d'Amanlis,' 'Marie Louise,' 'Louise Bonne of Jersey,' 'Durondeau,' 'Clapp's Favourite,' 'Chaumontel,' 'Marie Louise d'Uccle,' 'Glou Morceau,' 'Maréchal de Cour,' &c., when grown on walls produce fruit of the first and second quality when they have been duly thinned. Garden bushes and trees trained as cordons and espaliers in the open give a fair percentage of first grade, a large percentage of second grade,

and the remainder thirds. Orchard fruit is not expected to be so generally fine, yet good examples of the just mentioned varieties, and others such as 'Vicar of Winkfield,' 'Williams' Bon Chrétien,' 'Autumn Bergamot,' 'Beurré Clairgeau,' 'Jargonelle,' 'Bishop's Thumb,' 'Uvedale's St. Germain,' and 'Catillac' (the two last named being stewing pears) are often produced in orchards, and may properly be graded into about 25 per cent. first grade, 25-30 per cent. second grade, and the remainder third and fourth grades.

Cherries should receive attention in grading. Fine samples should be separated from those which are second and third grades, and the second being separated from the third. The colours white, red, and black should, of course, be kept distinct.

APPLES.

Although the grading of Apples, as well as of other fruits, has long been practised by a few of the advanced cultivators, yet the system has only been widely extended in comparatively recent years, and it still is not in universal practice unless we take the Order of 1918 as having established it in this country. Grading is, I believe, an interesting, instructive, and profitable operation, because by its means, the grower discovers the true quality of his crops of fruit annually, if he keep correct records of the weight, grade, and value received.

Whether the grading be better done by the use of rings of various sizes, or by weighing, is a matter deserving careful consideration, especially where many tons of apples have to be handled, and to test every fruit by means of a ring would be a serious matter.

In August 1914 I saw an apple-grading machine in operation on the premises of the Eardiston Farming Company, Tenbury, and it required five or six men and women to feed it with ungraded apples and to take away and pack the graded fruit. In the not very distant future, perhaps, dépôts will be established in apple-growing districts for grading the apples by machinery at a comparatively small charge for the convenience of those who have little time and labour for grading.

Dessert Apples collectively are medium in size when compared with culinary apples; and a really large dessert apple is not desirable. Consequently true dessert apples should not be too large to pass through a three-inch ring; but if they are too large they may be classed as special grade. If they pass through a 3-inch, but not through a 2½-inch ring, they may be classed as first grade. If through a 2½-inch ring, but not through a 2-inch ring, they will be second grade. Those which pass through a 2-inch ring may be classed as third grade. But these rules are rather arbitrary, because they would condemn nearly all 'Kedleston Pippins' to the third grade, and a large proportion of 'Cox's Orange' to the second grade, and 'Irish Peach' would fare no better.

Culinary Apples have a wide range in size, from the soft-fleshed

'Peasgood's Nonsuch' and the firm-fleshed 'Bramley' down to the 'Easter Pippin' (French Crab) and 'Old Northern Greening.' Consequently there are a number of varieties which naturally under fair conditions produce a fair proportion of fruits of special grade and a very large percentage of first grade, the remainder being mainly second grade, accompanied by a few only of third grade. Of this type of apple there are: 'Annie Elizabeth,' 'Beauty of Kent,' 'Alfriston,' 'Bismarck,' 'Blenheim,' 'Bramley,' 'Charles Ross,' 'Ecklinville,' 'Encore,' 'Emperor Alexander,' 'Gloria Mundi,' 'Grenadier,' 'Hambling's,' 'Lady Henniker,' 'Loddington,' 'Lord Derby,' 'Lord Grosvenor,' 'Mère de Ménage,' 'W. Wilks,' and 'Warner's King.' Other culinary apples may mainly be classed as first grade when good of their variety, the next size may be second grade, and the remainder third grade. But there is a group which is smaller than the group just mentioned; and as many of them are not likely to be profitable to grow, I refrain from naming them, because many old varieties must be discarded and replaced by better. This reminds me of an opinion expressed by the late Mr. John Wright many years ago, to the effect that small kitchen apples were too expensive either to grow or to buy, because when they were peeled and cored there was very little left of the apple.

In conclusion, may I offer one word of advice and encouragement to those who have not yet begun to grade their fruit before offering it for sale? I would say to them—Try it, and if disappointed, try again. And again, try, if again disappointed. And if disappointment again comes, and you are *sure* the failure is not your own fault—try another salesman or another market. Send first-class fruit to a first-class market.

The CHAIRMAN then announced that the meeting was open for a general discussion. If anybody wished to emphasize any of the points raised they could do so, or, if they disagreed with the views of any of the speakers, he should be pleased to hear what they had to say, because disagreement often led to more light being thrown on a subject.

Mr. JONES: I should like to ask Professor SALMON if there is any effective remedy for American mildew on the gooseberry, and secondly if he has recognized the Portugal Laurel as a host for 'silver leaf.'

Professor SALMON: American gooseberry mildew can be kept off the fruit by the employment of washes. The lime-sulphur wash at summer strength can be put on as a preventive before the mildew comes, and can be continued for a fortnight or three weeks with safety, until it interferes with the marketing. Then I should ask you to try the ammonium polysulphide, which leaves no deposit, and will keep your dessert varieties free from mildew. After the fruit has been picked you can give the bushes a lime-sulphur spray. Give them a good spraying and then leave them. Then as early as possible in the autumn start tipping the diseased shoots. It will not interfere

with the future growth if you are careful, but you must get rid of as much of the disease as you can. If you leave any disease on the bush be sure and spray early with the lime-sulphur wash in order to stop the appearance of the mildew in the spring.

With regard to 'silver leaf' and Portugal Laurel: this tree is attacked, and also the Laburnum, but the fungus does not produce its fruit upon the trees until they are dead. As soon as you find it on a tree it is a sure sign that the tree is dead, and you can do away with it and burn it.

Captain WELLINGTON, of the Food Production Department, said:— I think there are one or two points which require emphasis. The first point is with regard to distribution. I think the speaker overlooked one point, and I differ from him in his statement that you cannot do away with the middleman. In some cases there is a superfluous middleman, and it is the duty of the grower and the salesman to look into this matter. It sometimes happens in the London market that a lot of fruit is sent by a provincial buyer to a provincial salesman, and then to the retailer. The grower should send direct to the provincial market, and the only way that can be done is by a better system of telephones. Until we get that I am afraid there will be no change in the present conditions. I think it is a matter of great importance that we should have better telephone facilities. They already exist in the west of England, and in that part of the country all fruit is sold direct on the provincial market.

I was delighted to hear Mr. SMITH's remarks in regard to varieties. At the Board of Agriculture we are trying to persuade people to cut down the number of varieties as low as possible. You should plant as few varieties as possible, because we must get bulk of standard varieties, and until we get that bulk we shall not have a really sound British fruit industry.

At the present time 'silver leaf' is becoming a serious factor in regard to the 'Victoria' Plum, but the 'Persnore' is highly resistant to the disease, and I think it will have to be more generally grown until we succeed in growing other varieties which are resistant.

With regard to the breeding of new varieties of apples, I think at the present time we are years behind the times. In fact, we have not made much advance since Mr. KNIGHT was President of the R.H.S. a hundred years ago. We have had few really good new varieties during the last fifteen or twenty years, and we need new varieties possessing qualities commending them to the consumer and grower, and resistant to disease.

In regard to spraying, you often find people spraying with insecticides too late, whereas it should be done early in the season when the buds are just beginning to break. Early spraying gives success, whereas late spraying means failure, because you cannot get at the root of the evil. If you spray early for caterpillar, you do your work effectively, whereas if you do it now, it is only half-done, with the result that you only get a partial crop.

In regard to grading, Mr. UDALE said the fruit-grower had to adjust himself to circumstances, but we shall not get a British fruit industry until we get some system of grading, both in regard to size and also in regard to quality. What we really want is quality, and the Board of Agriculture are anxious that when any new planting takes place you should get the right variety. You must get rid of varieties which are more or less worthless and replace them by varieties of known value. Orchards should be designed with a view to obtaining quality; and we must get quality, otherwise our industry will go by the board.

A Member: I think that improper planting has a great deal to do with the large amount of disease which exists at the present day. Care should be taken that the trees are planted on the proper soil for the fruit to grow in, but I have often found trees planted in improper soil. I have planted perhaps a hundred trees, principally 'Cox's,' with the result that I get a great deal of fruit; but I am careful about the soil, and plant them four yards apart. All my trees look healthy, and do not want spraying. I think that proper planting will eliminate a good deal of the pests.

Mr. SMITH: I think bad planting has a great deal to do with it. You will find trees which will canker very freely in some positions, but if they are turned out and replanted in a more sheltered place they will keep perfectly clear. 'Cox's Orange Pippin' will do well in one place, but in another it will do badly. I have even known them to go for ten or twelve years, and then do badly.

The Member: I have had them growing ten or fifteen years, and have never had any trouble with them.

Mr. SMITH: You have evidently been very careful with them. I think there is more money lost in growing 'Cox's' than anything else.

A Member: Can you tell us the best varieties to plant together so as to ensure proper pollination?

Mr. CHITTENDEN: As far as I can tell from experiments carried out at Wisley, the only really important thing to do is to plant near one another those varieties which flower together. It does not make much difference what varieties they are, so long as they flower together.

Mr. CHART: I should like to endorse what has been said as to the importance of fruit-growing in this country. There is a point, however, I should like to bring forward, and which I hope the Chamber will take up. That is the question of compulsory spraying. I have been appointed to the Wilts County Education Committee, and in the course of my duties have come across a lot of old orchards which are often the cause of difficulties. Many of these old orchards are infested with insect and fungus pests, with the result that they distribute the disease to other orchards. I have been able to do good by using a little gentle persuasion; but in my opinion the time has now come when the Chamber of Horticulture and the R.H.S. should do something to bring about enforced spraying, otherwise I do not

know how we can deal with these old orchards. I think it is done in Canada, Australia, and the United States, but in this country people will not grub them up although they know the trees are not worth retaining.

A lady: With regard to old orchards, I think it would inflict a serious hardship on people if they had to grub them up, unless the Government compensated the grower. These old trees ought perhaps to be grubbed up, but if a man clears his ground he will suffer grievous loss. A man might have an orchard with trees which had been standing perhaps for forty or fifty years, and you could not expect him to cut them down in order to make room for clean youngsters. He might be deriving a fair income from his old trees, but if he planted young ones he would derive very little income for several years.

Th CHAIRMAN: I think it is too big a question to suggest that the State should provide the capital to replant an old orchard. If you do that, another man would ask the State to provide him with a new orchard. I think the last speaker rather misunderstood the point. The trouble was not so much with the old trees, but with some of the old orchards which were infested with insect and fungus pests. I do not think we can suggest that the State should compensate a man for cutting down old trees, especially when we consider that at the present time the State are out for collecting money and not for distributing it.

A Member: I was at a meeting at Croydon last week, when we sent a letter to the Croydon Corporation recommending that in any town-planning schemes consideration should be given to the planting of fruit trees and fruit bushes. I think this should be done in all town-planning schemes.

The CHAIRMAN: It is a very good suggestion.

Mrs. ARTHUR WEBB: I think, too, fruit-growing should be encouraged on railway embankments, as it is in Holland. In Holland the authorities lease the land to various growers, who plant fruit trees along the railway embankments and round the reservoirs, with the result that it is quite a profitable industry. There are immense areas of land in England along the railway embankments. It may be news to some of you, but the Underground Railway are leasing certain small orchards to their employees for one shilling a year. I think they get sufficient land to grow twenty trees for two shillings a year. If the Underground Railway can do that, why cannot the great corporations like the Great Western Railway and the London and North-Western Railway?

The CHAIRMAN: I think we have had a very profitable discussion. It seems to me, in summarizing the various speakers, that the best thing to do is to select the right varieties which will grow in a particular district. It is no use having a variety which does best in a neighbouring district, but you must plant the variety which will grow well in your own district. Then you must grow those varieties which are best suited for your purpose. If you have one hundred trees do

not grow twenty varieties, but if possible only two varieties. If you have a thousand trees, only grow two varieties, because it will help you in grading, marketing, and in every other respect. When you have a fruit crop, do not stand under the tree and shake it, and run away with the idea that those which drop off are ripe, and those which will not drop off must be shaken off in a week's time. Half the complaints from growers are caused by the fact that their fruit is put on the market in a badly graded condition, and of very poor quality.

With regard to distribution, when there is a glut of fruit in one area, means should be available for distributing it over the whole of the country. If you have a glut of 'Pershire' plums, you should be able to distribute them in Glasgow, Bristol, and the south of England. If we had a proper telephone system whereby the grower could be put in daily touch with the markets, it would save a lot of fruit from being wasted. By a proper system of telephonic communication we could at once ascertain where the fruit was wanted, and it would then be possible to give a proper return to the grower, and would induce him to increase the area under cultivation. Then again the public would get good fruit at the right price. If the public could obtain that, it would increase the public demand for fruit, and those two things together will bring us to the point that we shall have a national fruit industry. It also brings us to the point that we are now paying enormous sums every year to the foreigner for sending us fruit which we should produce at home. If we can bring these various suggestions about, we shall be able to circulate our money inside the country, for the benefit of our own people, and not for the benefit of the foreigner, and this is a question which we shall have to keep constantly before us during the next few years.

Mr. MORGAN VEITCH : I have been asked to propose a vote of thanks to our Chairman, but before doing so I should like, on behalf of the R.H.S. and the Chamber of Horticulture, to thank you very sincerely for the excellent attendance you have given us, and for the close attention with which you have followed the speakers. A few years ago we had a good deal of apathy at these meetings, and people looked bored with the speeches, but this afternoon there has been nothing of the kind. I have noticed how earnestly you have followed each speaker, whether on the platform or amongst the audience, and I am sure we are grateful to you for having taken part in the discussion this afternoon. It is really a joint-conference of the R.H.S. and the Chamber, which, as you know, looks after the financial interests of professional growers. I am sure you will join with me in thanking the speakers for devoting their valuable time in laying before us so many practical points. Their time is extremely valuable; they have devoted time not only to their speeches, but they have focussed long years of study into short speeches this afternoon. I think we ought to congratulate ourselves in having as our Chairman Mr. GEORGE MONRO who has rendered great services to the State for the past five years—in connexion with the Food Production Department, the

Board of Agriculture, and the Special Constabulary, and the immense amount of work he has done for the Chamber of Horticulture.

With these few words I will now ask you to pass a hearty vote of thanks to all the speakers and the Chairman.

The motion was put to the meeting and carried unanimously.

The CHAIRMAN : I thank you very much, and I can only express the hope that a good many more similar meetings will be held by the two Societies, because I am sure it will greatly benefit the members of both.

BOTANY.

By EDWARD WHITE.

[Read March 25, 1919; Sir ALBERT K. ROLLIT, LL.D., in the Chair.]

MOST people are willing to pay lip service to botany as an interesting subject, but the true relation which the science bears to the daily life of man is appreciated by comparatively few. We are a practical people, and there is a popular impression that botany is a science of small practical importance, offering as its best reward the discovery of obscure plants in field, hedge, or woodland. Even many, who know that botany represents the scientific foundation upon which this Society stands, imagine that its chief aims are the classification of plants and the production of new forms of beauty in flower and foliage. Most dealers in every-day commodities would smile at the suggestion that botany could be employed in any way to influence their business to advantage.

A wider conception of botany was suggested when I was asked by a company, interested in the exploitation of a large tropical area, to introduce a man of first-class ability and expert in economic botany—i.e. he was required to identify plants of proved commercial value, to estimate the possibilities of new discoveries, to act as physician to cultivated crops, and also as botanical consultant in all matters connected with agriculture, horticulture, and forestry.

The appointment had interesting possibilities, and I was sorry I could not find among my friends anyone qualified to fill it. The manager of the company said he expected they would have to get hold of someone, whom he vaguely called a "foreigner," after the War.

Shortly afterwards, I was asking about the work of a certain boy, and I was told that he alone in a school of 400 pupils was taking up the subject of botany. I should have been less surprised if I had known then how very little the study of botany was practised at public schools generally. Plenty of first-class reasons can doubtless be given for the omission, but there seems to be a certain connexion between this fact and the difficulty of finding a man for the appointment referred to. This view is supported by the prospectus of the University College in one of the most important business towns of England, which I saw by chance only this week. Among about twenty-five subjects of science and art, for the study of which provision was advertised, botany was conspicuously absent.

You may notice, moreover, that, as reported in the public speeches of authorities concerned with the promotion of science, the word botany is very rarely mentioned.

When I asked the Royal Horticultural Society whether it might not be desirable to stimulate further the study of economic botany, I was invited to read a paper on the subject. I did not bargain for such an answer, but the matter seems to me so important that I presume to call attention to a few points which, however elementary to the few experts who have been trying for some time to enlighten public opinion on the matter, may give a fresh idea of the possibilities of botany to some who have not thought about the subject.

British science suffers from the chief defect of the old "Contemptible Army." The personnel is too small for the needs of the great Empire. Little help is received from laymen, for a wide gulf stands between the average Englishman and the scientific expert—the former recalls, perhaps, the superior attitude which boys are too often taught at school to adopt towards the "modern" men. He is as reticent in referring to science as in speaking a foreign language. Formerly, he preferred to let the other man speak English; nor did he worry if Germans filled important scientific appointments of this country. Unfortunately, even the lessons of the War have not taught some people the value of science and the importance of finding out the best means to a given end. It has been suggested in more than one responsible newspaper that British character has beaten German science in the great War: the fact being, I believe, that British character was losing the War until British science was called in aid.

In the war of industry also, which looms ahead, business capacity will have to be supplemented by superlative efficiency if we are to hold our own. Not every man can nor need be what we call a scientist, but it can and should be part of the education of every child in this country to be taught precisely what science means and why it is imperative to maintain under favourable circumstances our quota of investigators in every branch of knowledge.

Not many of us are anxious to converse with Germans, in any language, at present; and there are loud demands in many quarters for their future exclusion from British scientific appointments. This will be as it will; but it is worth noting that the Revolutionary German Government has decreed that henceforth science will be taught in schools without charge; so, certainly, there will be in the future more Germans than ever capable of filling such posts in other countries, if not in our own.

To the shoemaker there is nothing like leather, and those who are interested in British Horticulture must encourage high efficiency of the parent science of botany. Especially important is economic botany, which is charged with the study of plants in respect of their use to man.

The vegetable kingdom is probably the greatest on earth, judged by the number of living subjects. The expression, "Vegetable Kingdom," recalls that game of one's youth, which hardly suggested the true proportion of objects originating in plant life. There is little in

the appearance of linen, sugar, or rubber, for instance, to remind one of their vegetable origin. But when we remember that food, fuel, clothing, building material, furniture, oils, paper, medicines, rubber, and hosts of other essential materials, are derived from plants, we get a hint of the breadth and universality of the vegetable kingdom. Without plant-life, man, as we know him, would not be.

The raw material required for the purposes mentioned is built up by chemical action and stored in one part or another of a plant. Plants are therefore so many laboratories engaged in the manufacture of all kinds of chemical bodies which man is slowly learning to convert to their best use. Through successive centuries these discoveries have been made—first by accident, then by experience, and finally by intelligent investigation. The dearest ambition of botanists is to penetrate into the inner recesses of these laboratories of Nature, to discover there her secret processes and to employ her forces to carry out their own designs. The labour of Nature is the cheapest in the world, and correctly handled she does not go on strike.

Primitive man must have wandered like an animal, relying upon Nature to supply his appetite for vegetable food and other necessities of life.

Necessity and instinct taught him to protect and eventually to cultivate those plants which best satisfied his needs. Judging by our own conservatism to-day in the matter of food, one would imagine that when a plant was once found that was nourishing and easily grown, little heed would be given to the cultivation of other plants. Interchange took place among neighbours, and introductions were made by conquerors, so that in process of time a considerable number of nourishing plants have been evolved. We know, however, that the number of plants cultivated for food is very insignificant compared with the many still capable of important development. There is still an immense field for experiment in this respect.

In many large areas throughout the world the great reserves of the vegetable kingdom still await investigation with all their possibilities of improvement and development.

Under cultivation many kinds of plants have appreciated out of all resemblance to their original form. Most cultivated plants are recognizable in a much more elementary form.

The necessity for adaptation to new conditions of climate and soil has effected remarkable modifications in some instances, and striking transformations have resulted from cross-breeding between plants of the same family. In the prosecution of such experiments the future holds equally interesting promise.

Many valuable varieties of plants have been produced by haphazard hybridization. Small insects have been responsible for many such productions, whether new flowers of much beauty, fruit of improved flavour, trees of exceptional size or quickness of growth, or varieties of edible plants capable of resisting disease and drought. The latent qualities in plants which a casual insect may unlock have

proved so surprising that one dare not put a limit to the possibilities which may be behind the experiments of intelligent men working with definite purpose.

Valuable experimental and practical work has been done in this direction in this country, but it has been generally confined to familiar edible plants, vegetables, and fruits, and to the improvement of flowers and foliage in ornamental plants. There are many other directions in which experiment and research has given and can give further important industrial results. The chief method of emphasizing a desirable quality in a plant is to select parents which most nearly approach the conditions aimed at, and from the issue of this fertilization to select and cross again and again those individuals which show improvement in the required direction.

When the principle is granted that it is possible to accentuate special qualities in plants with considerable certainty, there need be no reasonable limit to the ambitions to which imagination may aspire in their improvement when controlled by knowledge and patience. This applies not only to food plants, but to other plants whose chemical properties make them valuable for specific industrial purposes. It is important to realize that research operations of this nature are necessarily slow and unspectacular, even if the eventual results may appear miraculous.

It has been pointed out by Sir E. RAY LANKESTER that, in spite of the great accumulation of knowledge concerning plants cultivated by man, complications and contradictions are continually arising both in the study of established plants and in the growth of new varieties. Finality is never assured, and the work of the botanist can scarcely ever be said to be completed in any one case. From time to time new plants are found which make a back number of apparently staple industries. Chemists have learned to make from the refuse of coal and wood many compounds which were formerly at greater expense and with less certainty obtained from plants. Consumers get new ideas, preferences, and fancies. Improved transport opens new sources of supply. Many circumstances are liable to unsettle established methods of manufacture or business based upon plant production, and there is constant need for the protective anticipation of economic botanists in every country.

The immense material waste caused by four and a half years of war will have to be made good in a large measure by the chemical activity of plants. This must necessarily be a slow business, and everywhere is a cry for greater productivity. It is conceivable that a few happy discoveries by botanists might have important consequences in reducing the losses of the War. So much of the raw material required for our industrial purposes is grown out of the country, that the extent of the waste is not very evident to us, the most noticeable indication being the destruction of woodland. Some misleading deductions might be drawn from the new activity in food production by small cultivators and allotment-holders. But useful though this

work has been, and much greater though it may be, their total productions have counted for little in the aggregate of food requirements of the country. The consequences, however, of turning the thoughts of such a large number of intelligent people to consideration of the products of the soil may be very important. The fact is emphasized that there is plenty of plain, straightforward work for the botanist to do here before imagination need open up new fields of discovery.

Every gardener is familiar with the cry for the best variety of every sort of plant, and nurserymen and seedsmen are always trying to turn out something better than the last. Most of the problems involved in scientific husbandry turn upon the variety of the plant grown—for the plant is the thing. Such problems include inquiry as to the variety of the finest flavour and bulk, or the variety which contains in the most concentrated and accessible form the special property which makes it valuable—the one which can be most cheaply cultivated as regards labour and manures, and the one which exhausts the soil least; which is the best resistant to certain diseases or drought, and incidentally the one which offers most useful by-products. The evolution of the ideal plant for a given purpose is work for the botanist, and this task alone offers sufficient justification for his existence. The wholesale purchaser, or manufacturer, who uses raw material, employs the most expert buyers he can get, and in many cases the analyses of practical chemists are needed in order to test how nearly its qualities approach what is looked for in the ideal product. The grower needs the assistance of botanists, to stand towards him in the same relation as the chemist to the manufacturer; and between the chemist and the botanist there should be constant co-operation. The services of the botanist would ultimately be as advantageous to the manufacturer as to the grower.

It would be invaluable to the cultivator of small holdings to have reliable assistance in respect of the maximum possibilities of his land, especially if, as is possible, entirely new plants of economic value could be introduced.

During the bad years of farming in the last century, cultivators often had to plant crops knowing they were bound to lose money on them. They often chose those on which they stood to lose least for the moment, although by so doing they reduced the value of future crops. Botanical research and experiment would be an important insurance against the recurrence of such disastrous days.

The supply of food for future generations is likely to be an increasing problem. The man in the street says airily: "Oh, science will look after that!" without realizing that the opportunities of science in this country depend upon the encouragement he affords.

There are many large wasted areas in this country with soil far more fertile than that which in other countries has been improved into valuable agricultural land. There are also enormous tracts of land throughout the world which have more excuse for contributing nothing to the world's larder—rocky mountain-sides, sandy wastes,

water-logged flats, and dense thicket growths. The enlistment of a considerable proportion of these wasted areas to do their share in the world's economy may eventually be absolutely necessary to the human race. Encouragement is given to the possibility of finding plants of industrial value suited to these areas by the fact that many of them already maintain vegetation of a sort which may provide the basis of evolution.

Many unpromising areas have already been brought into use by the discovery of particular plants which grow under existing conditions or by the introduction of plants which flourish when freed from the strangling competition of other plants on more fertile soil.

We are familiar with the bleak downs in Sussex, where on two or three inches of soil, in which nothing else of value does much good, the shallow-rooting sheep's-fescue makes possible a famous industry in sheep-breeding. Similar cases occur elsewhere in Great Britain. Then there are expanses by the sea-side, where barren wastes of loose sand are raised several feet high by one wind and laid flat by another. These areas are being fixed and made stable by the aid of the valuable marram-grass, and the land is consequently rendered suitable for the growth of trees. A good object-lesson is found in the cultivation of alfalfa (better known to us as lucerne).

In the United States alfalfa is an imported plant, and even ten years ago the value of the hay it produced was put at twenty-five million pounds. It is described in an official report as the great forage-plant and soil-renovator of a vast area in the Rocky Mountains. It is specially suited to arid regions subject to drought, and of particular value as a rotation leguminous crop, and because its growth greatly increases the productivity of sterile soil. Varieties have been introduced into America from oases in the Sahara, types from Turkestan resistant to drought, others from Siberia resistant to cold, sand-lucerne from North Europe, and other varieties from Arabia, Peru, and Chile.

The Americans are extremely anxious to develop the possibilities of the sterile areas in their country, and set great store by this plant as a fertilizing agent.

Such miracles in the matter of adaptation to soil and climate have already been effected, and such unsuspected qualities have been developed in plants, that it is impossible to say what latent powers may still await revelation by calculated experiment. The freakish powers of Nature are bestowed impartially upon the plant and animal worlds, and it is not to be supposed that they were exhausted when Nature first uplifted the palm beyond the reach of browsing animals, and then drew up the long neck of the giraffe in pursuit; or when she invented the hump of the camel, the larder of the so-called ship of the desert; or designed the marvellously sure foot and mathematical eye of the chamois.

Another war, such as we have just experienced, would leave the world perilously short of timber. In this direction a magnificent

field for research is open to botanists not only on the recognized lines of scientific forestry, but in the direction of speeding-up Nature and improving by hybridization points which give special value to timber—such as grain-markings, strength with lightness, &c.

At present it takes the lifetime of a man to get many kinds of trees matured for ordinary timber purposes. Of what immense value it would be if the period of growth and development could be appreciably shortened. The growth of trees for timber in bulk is a different matter from the cultivation of those which supply valuable chemical products—such as sugar, resin, camphor, rubber, and so forth. The latter involve a new set of problems and the special co-operation of chemists.

Botany abounds in questions which scientists hesitate to answer. Among these problems none needs more complete and continued investigation than the subject of the diseases of plants. Finality can no more be achieved in this matter than in the case of the ailments of mankind.

We think casually of the soil as so much inert or dead material, whereas in reality it swarms with myriads of organisms as keenly anxious to live at the expense of other life as man himself. Some of these minute organisms are necessary to the existence of more advanced plants, while others are parasitic and deadly. It is the aim of one branch of botany to identify them respectively, to work out their life histories and deal with them faithfully according to their deserts.

Plant life is more or less the prey of all life, and in many respects a passive victim.

We are able to protect effectively the plants we cultivate from the attack of their larger enemies, but the smaller fry, especially those of fungus growth which we call disease, are more subtle and more difficult to deal with.

Many plants have learned to defend themselves from enemies of long standing by special development in height or shape, toughness of bark and leaves, ferocious thorns, subtle poisons, disagreeable odours, and various other devices. Against fungus diseases, however, their natural defences are often weakened owing to adverse conditions of the atmosphere and soil. Possibly, plants sometimes learn to protect themselves from disease by means of adaptation; but the principle of the survival of the fittest applies equally to the enemy organisms, and they too may adapt themselves to new adaptations, until it becomes a case of which can go one better. Meanwhile, the agriculturist is losing his crops. It is for the botanist to keep up to date with the latest moves of elusive enemies, and to give the crop-plant all available assistance in defence against attack. Prevention is better than cure, and the evolution of disease-resisting plants would be more satisfactory than revenge upon a partly victorious enemy. An equally important issue is the discovery of methods of cultivation which enable plants best to resist attack.

The actual loss in wealth by disease and insect enemies of plants is inconceivably great, but certain historic examples stand out in particular.

The destruction of the French vineyards is a well-known example, when the loss amounted to 400 million pounds in twenty years from the ravages of phylloxera. The vine industry was reinstated by the introduction of an American variety, of which the phylloxera does not seriously injure the roots, and the French vines were grafted upon American stocks.

The historic Irish famine was caused by the loss of an entire year's crop of potatoes from the well-known disease.

I have not seen any estimate of the total year's loss to British agriculture; but one who knows says that it is very great, and that practically every crop has its pet enemy.

A third of the crop of hops has been destroyed in a year, with the resultant loss to growers and pickers. It is estimated that the annual loss to American agriculture approaches 100 million pounds; and many other well-known cases of widespread disaster could be quoted to demonstrate the immense importance of the work still awaiting the investigator of plant diseases and insect enemies.

If we glance for a moment at other countries, we note that the world owes a greater debt to China than is generally recognized. For four thousand years an industrious and intelligent race has taken intense interest in the plant industry. These people have known how to develop to perfection their rich native vegetation, many species of which are almost unknown to us. They have provided staple industries to many parts of the world, which are identified with the cultivation of some particular plant. Tea, oranges, peaches, and some of the best plums, for instance, originated in China, and possibly the olive, as well as many industrial plants of the greatest importance.

It would be interesting to know what the Chinese could have made of our native wild fruits, taking, as one example of their work, a thorn-hip, which has been improved into a favourite national fruit as large as a medium-sized plum.

The American Government recognizes that agriculture, and the cultivation of plants for industrial purposes, represents the greatest potential wealth of their country. Since 1905 an extensive examination of the plant resources of China has been undertaken, under Government control, in addition to enterprise elsewhere, with the object of introducing industries which promise success in America. Important plant-testing stations have been established, where tests are made of the possibilities of the plants introduced.

The Germans were determined to make the fullest use of the vegetable wealth of their late colonies, and had subjected them to minute botanical investigation, of which the results were classified and published with reference to the economic possibilities.

The British Empire possesses an immense proportion of the

lands of the earth which are richest in existing plant life and in the possibilities of future development. Many of these areas await full investigation. We and the Dominions are consequently trustees of vegetable wealth, the extent of which cannot be estimated even by experts, and of the value of which most English people have only the vaguest idea. It is a question whether this wealth shall be inadequately utilized until others appropriate it, or whether we ourselves shall make use of the fortune into which we have stumbled.

The answer depends, I believe, on the extent to which the science of economic botany is encouraged by the ordinary business men of this country.

In greatly daring to read a paper on this matter, I have not pretended to speak as a scientific expert. I am concerned only to try to add to the number of those who recognize the value of the work already done by economic botanists in this country and the need for affording them the assistance to which they are entitled.

For, of course, the matter is not neglected by our scientists. There are a few centres of research and education where botanists are keenly alive to the matter and quite abreast with the times. It is they who insist that they are too few for the great tasks which call for their attention and the work which lies ahead. Experiment is needed in every direction, and research can only be carried on by men whose livelihood is assured and for whom appointments are waiting which will be sufficient inducement to take up economic botany as a special branch of science.

I saw, the other day, that the Board of Agriculture was making a large grant for investigation into the science of poultry breeding. This act encourages one to hope that in the course of time the importance of the science of economic botany, of which I have so imperfectly pleaded the cause, may eventually receive adequate recognition.

May I conclude with a dictum of Mr. ARTHUR BALFOUR: "The great advancement of mankind is to be looked for in our ever-increasing knowledge of the secrets of Nature"?

THE FIFTEENTH REPORT ON METEOROLOGICAL OBSERVATIONS AT WISLEY.

By the late R. H. CURTIS, Hon. F.R.H.S.

THE most outstanding feature of the weather of 1918 was undoubtedly its unusual wetness over the greater part of the kingdom, although the excess of rain above the normal varied considerably in different districts. At Wisley the total yearly fall exceeded the average by twenty-three per cent.; but in July the amount of rain which was measured at the Gardens was double, and in September treble, the usual fall for those months; whilst in August it totalled but little more than three-quarters of an inch, or only one-third of the average amount. The only other months with a fall of rain of less than an inch were February and March, both of which were unusually dry.

This illustrates very well the need for a reasonably long series of observations upon which to base average values if they are to represent climate fairly; and in this connexion we may note that, with the completion of this year's results, we shall be able to improve our basis for such comparisons at Wisley, by including in future mean values the observations of a third pentad, the closing year of which is that now under review.

As regards temperature the mean for the whole year was nearly normal; but in some parts of the country, in individual months, the deviations from normal were considerable, both above and below. The coldest night of the year occurred in January, when the thermometer registered 4° Fahr. on the grass. February was unusually mild throughout. March was warm, but April decidedly cool, with some sharp frosts which did considerable harm to fruit trees. May was the warmest May experienced for several years; but with the warmth came a plague of insects which did great damage to foliage of all kinds. A feature of June was the abnormal frequency of night-frosts, but there were also a few exceptionally hot days, and these to some extent balanced each other, so that the average temperature was nearly normal. July was cool and unseasonable, and during the middle of the month very wet also. In August the temperature varied a good deal, but on the whole the weather was fairly normal; the hottest day of the month was the 22nd, but the following day was almost the coldest, and really hot days were rare. September was really cold all through, occasionally there were night frosts, and in the screen, four feet above the ground, the thermometer at Wisley only once reached 70° , but on another occasion it fell very nearly to the freezing point. October was a normal month as regards temperature, but it was followed by a cool November, whilst the

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year ended with the warmest December experienced in Great Britain for many years. In the British Isles as a whole the mean temperature for the year was slightly above the normal, but nowhere was the departure at all large.

In the following paragraphs the weather of each month is dealt with in more detail. The results of the daily observations made at the Observatory in the Gardens are summarized for each month in the following table:

SUMMARY OF RESULTS OF DAILY OBSERVATIONS MADE AT THE CLIMATOLOGICAL OBSERVATORY IN THE SOCIETY'S GARDENS AT WISLEY.

	Temperature.					Rainfall.			Wind.		Sunshine.			
	Air.			Soil.		No. of Days of Rain.	Amount of Rain measured.	Equivalent in Gallons per Sq. Yard.	Prevalent Direction.	Mean Hourly Velocity. Miles per hour.	Vapour in Air. Complete Saturation = 100. Per Cent.	No. of Hours recorded.	Per Cent. of Possible Amount.	No. of Sunless Days.
	Mean Temperature.	Highest Temperature.	Lowest Temperature.	Lowest Temperature on Grass.	No. of Ground Frosts.									
January .	39	56	18	4	25	14	3.20	15	S'y.	6	91	60	23	9
February .	43	57	20	9	14	18	0.99	4½	S.W. to S.E.	8	88	73	26	9
March .	43	69	25	13	28	8	0.82	4	N.E'y.	6	84	149	41	4
April .	45	64	30	18	17	18	3.72	17	N.E'y.	5	88	85	16	9
May .	56	83	39	27	8	9	1.69	8	N.E. & N.W.	4	74	240	50	3
June .	56	79	37	26	11	8	1.34	6	N'y.	4	67	240	48	none
July .	61	80	43	31	2	18	5.76	27	S.W'y.	5	73	209	42	none
August .	59	88	44	32	1	9	0.82	4	S.W. & N.W.	4	75	194	43	1
September	56	72	35	25	3	20	5.63	26	S.W'y.	7	81	159	43	3
October .	50	63	30	20	15	14	1.18	5½	S.W'y.	4	89	79	26	8
November	43	58	24	17	22	15	2.39	4	S.W'y.	3	91	69	27	8
December	47	58	27	16	11	17	2.02	9½	S.W'y.	8	93	33	14	15

January was unusually cold during its first half, and then remarkably mild throughout the latter portion, the two periods being respectively quite typical of winter and of spring. A very heavy downpour of rain and sleet on the 13th brought the first period to a close, the fall at the Gardens measuring nearly an inch and a half, and although the wet weather continued for several days afterwards it nevertheless became very mild and spring-like, the temperature

rising more than once so high as 56° . Notwithstanding this, however, vegetation at Wisley remained apparently quite dormant, and so far as could be seen there was no appreciable movement even in Hellebores—a sluggish condition which appears to have been very general in gardens all over the kingdom.

February.—The prevalence of warm southerly winds kept the temperature considerably above the average. These warm winds were due to a series of cyclonic disturbances which passed across

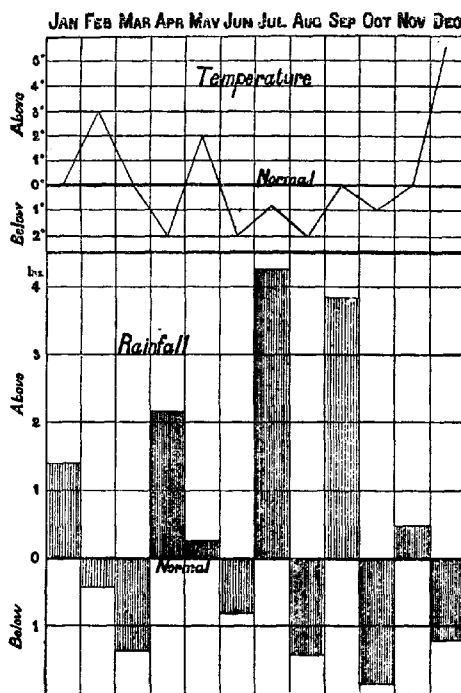


FIG. 7.—DIFFERENCE OF MEAN TEMPERATURE AND OF RAINFALL FOR EACH MONTH FROM THE AVERAGE.

our western coasts, following an easterly track, and bringing with them a current of warm air which spread all over the kingdom. At the Gardens the thermometer rose to nearly 60° in the daytime; whilst at night, owing to terrestrial radiation being checked by cloudy skies, there was but a slight fall, with the result that we had warm nights as well as warm days, and a high temperature for the season all over the kingdom. Both for agricultural and horticultural purposes the weather of the whole month was ideal; and at its close the "Season" was far ahead of what had to be recorded for the corresponding period in the preceding year. In some parts of the kingdom

the rainfall was large, but at Wisley it was only moderate in amount, and came chiefly in the first ten days of the month. In most districts less than the normal amount of bright sunshine was experienced, but at the Gardens the deficiency was not very great, the average daily amount being two and a half hours. As the general result of these favourable climatic conditions all early flowering bulbs, and also trees and shrubs, began to move rapidly, and reports were received from several districts that apples, plums, and cherries were already "looking very promising."

March.—Throughout the greater part of this month the weather was of the quiet type which usually accompanies what are known to meteorologists as "anticyclonic conditions." Occasionally there were strong winds, but they usually occurred in districts of limited area—such as a portion of the south-east coast where they caused some damage in exposed gardens—but they were by no means of general occurrence. It was a decidedly dry month, and a deficiency of rain was experienced over the kingdom generally. Temperature was high for the season, and especially so towards the close of the month, when at some favoured spots the thermometer rose to between 60° and 70° in the shade. With such conditions vegetation made rapid progress everywhere, and the general report from all parts of the country was of satisfactory progress in all garden and farm work, and in growth. At Wisley all early flowering plants made great strides and all arrears in growth were very soon overtaken, and normal conditions established, notwithstanding that as a set-off to the warm days there were many cold nights with frequent frosts of some severity. At Wisley seven degrees of frost was the lowest reading recorded in the screen, four feet above the ground; but on the ground itself the thermometer fully exposed to the effect of radiation—as of course are all plants under normal conditions—registered nineteen degrees below the freezing-point on the night of the 16th.

April was a month of abnormal weather, the winds being persistently northerly and easterly, and the weather in consequence cold, and by no means spring-like, until quite near the close of the month. At Wisley the rainfall was excessive; and in many parts of the south-east of England, with longer records of rainfall than Wisley has as yet, the record of rain was larger than had been recorded in any preceding April. With this, of course, overcast skies were the rule, with a lack of sunshine; and the reports of the weather generally spoke of it as wet and cold, with vegetation in a backward condition, and much retarded by the cold easterly winds. All over the kingdom the temperature was below the normal. Snow and sleet occurred in many districts; and in some places hail fell with sufficient force to do much harm to the budding fruit trees. The wettest districts were the south and east of England, where at several places larger falls of rain were recorded than in any previous April for many years, with much mist and haze, and with very little sunshine.

May.—The cold and inclement weather of April continued into

the first week of May. Then the wind changed from east, which had been its general direction for some time, and became westerly. This was accompanied by a decided increase of temperature and a general improvement in the weather, although it was also attended by severe thunderstorms and heavy local falls of rain and hail. Some of these storms were of exceptional severity, especially those that occurred in the north of England and south of Scotland. In one of them an observer counted forty-five flashes of lightning in one minute; and as evidence of the severity of the storms generally much damage was reported to have been done to potatoes and other growing crops, whilst in places timber trees were so cut about by hail as to appear defoliated. Damage from the rain, hail, and lightning which accompanied the many storms of this period was more or less severe in places scattered over a very large area; but this was due entirely to the unwelcome violence of the storms—the rain they brought with them was much needed and very acceptable indeed. But on the whole it was a splendid growing month, with an abundance of sunshine and sufficient rain, and without frosts by night, or nipping winds by day.

June.—The peculiar feature of this month's weather was that, after beginning with a couple of abnormally hot days, there ensued a long spell of cool and altogether unseasonable weather, lasting to within a couple of days of its close, when it wound up with another brief spell of seasonable midsummer warmth. The winds were from a northerly or westerly direction throughout the greater part of the month, keeping the days cool; whilst with clear skies at night terrestrial radiation was very active, resulting in low night temperatures and much more frequent ground-frosts than are usual or desirable in June. At Wisley the thermometer laid upon the grass, open to the sky, fell to freezing-point on a dozen nights; and bracken on the adjoining common, and potatoes growing in more than one part of the garden, were "cut" on the night of the 5th; and still more badly on two occasions later on towards the close of the month; beans and marrows also suffered at the same time. The month was a dry one, and there was a very liberal amount of sunshine; but owing to the lack of rain the crops generally suffered from drought, and notwithstanding the sunshine the weather of the month as a whole was cool and unpleasant. The deficiency of rainfall, although general, varied considerably in degree over the kingdom, but everywhere the fall was below the normal amount. At the Gardens it represented only six gallons of water to the square yard, which is little enough for a midsummer month, and especially so since one-third of it fell on a single day—the 14th.

July.—Both the beginning and the end of July were dry and warm, but in the middle three weeks rain fell in greater or less quantity every day, giving a total fall for the month of five and three-quarter inches—the largest fall in any July since the observations have been made at the Gardens, and representing a deposition of over twenty-seven gallons of water to the square yard. The effect of this phenomenal

rainfall upon crops generally was to cause them to make extraordinary progress; but, on the other hand, the sodden soil of the beds in which seed had been sown became "set" and hard, so that small seeds especially were unable to make their way through, and were spoiled. Crops generally were, however, at the close of the month looking remarkably well, and there was the promise of a good harvest, and in particular of an exceptionally fine yield of wheat. Generally speaking, there was more than the usual amount of sunshine notwithstanding the large rainfall; but at the Gardens there was no day without some sunshine being recorded and its daily average duration was six and three-quarter hours—this, in the same month as the maximum fall of rain. Another feature of note in the weather was the unusual frequency of thunderstorms, some of them of great severity and accompanied locally by phenomenal falls of rain.

August.—The weather throughout this month was on the whole dry and bright. The rainfall was below the normal amount everywhere, and the only falls of any consequence at Wisley occurred in the first two or three days of the month. Throughout the entire month there was only one entirely sunless day (the 2nd); and on the hottest day of the month the temperature in the shade rose to nearly 88°, and this proved to be the highest temperature of the year recorded at the Gardens. There were, however, but few outstanding really hot days, and at night the temperature was not seldom low for the season; whilst the thermometer laid upon the grass, fully exposed to the sky, once fell to the freezing-point. The winds were from the south-west almost throughout the month.

From reports received from various parts of the kingdom it seems that on the whole the weather of this month was seasonable—good for the ripening and harvesting of crops, and yet providing plenty of grass and aftermath in the meadows. And although this conspectus may not hold good for the entire kingdom, yet the exceptions were limited to small areas widely separated.

September was unusually wet. Indeed, for the district around the Gardens such a wet September had never before been recorded since rainfall observations were begun in 1904. At Wisley the fall approximated closely to six inches, and the soil became thoroughly soaked. Potato disease became very widely and badly developed; whilst shrubs and trees, and indeed nearly all vegetation, developed an extraordinary amount of leaf-growth. Squalls of wind and rain, and also thunderstorms, were of somewhat frequent occurrence; and on the 12th there was a furious squall of wind and rain in which the wind velocity rose to fifty-five miles an hour—an unusual velocity for an inland district. As a set-off to the discomforts of such a wet autumn, it is at least comforting to read that "the public health was good," as indeed is not unusual in wet seasons; but the temperature was below the average for September, and from the horticulturist's point of view the weather of September was by no means ideal.

October.—The weather of this month may be quite fairly described

as dull, damp, and cheerless; the first portion of it was also very stormy, and in some of the south-westerly gales which were experienced the wind attained considerable strength. The temperature was upon the whole rather below the normal, and occasionally sharp touches of frost were recorded in the screen, whilst upon the ground frosts were both frequent and severe. During the latter part of the month there were many wet fogs, but the total precipitation from both rain and fog was not very great. In addition to this there was very little sunshine to relieve the general dullness of the month, but as the

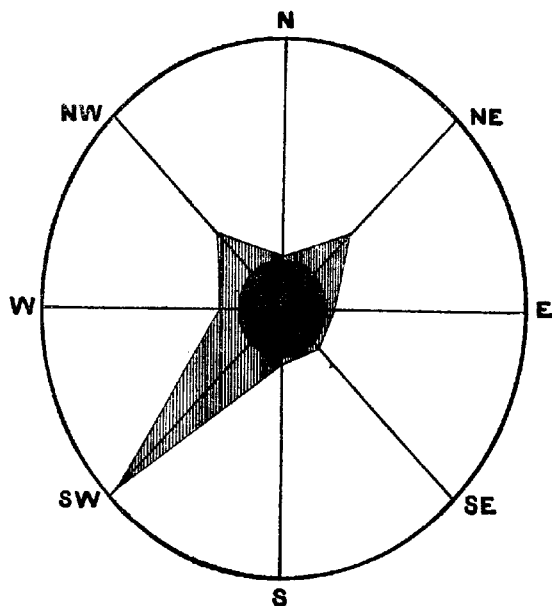


FIG. 8.—ANNUAL DISTRIBUTION OF WINDS ROUND THE COMPASS. THE PREVALENCE OF CALMS IS INDICATED ON THE SAME SCALE BY THE DIAMETER OF THE CENTRAL CIRCLE.

result of a few really bright days, the daily average duration of sunshine at the Gardens amounted to two and a half hours. Over the kingdom generally a good deal of unharvested corn was spoilt by the excessive wet even before it could be cut, and from the same cause the unlifted potato crop also suffered, whilst autumn work on the land was necessarily much delayed. It is, however, worth noting that this was less due to the amount of the rainfall than to its persistency, many observers calling special attention to the fact that although the fall of rain was *less* than the normal amount it was spread over an abnormally large number of days, resulting in weather which can be better described as “damp and dull” than as “rainy.” It resulted, however, in much damage being done in some districts to hay and corn—hay-making being still in progress

in the Peak district in the last week of the month, whilst in parts of Essex and Herts strawberries, raspberries, and plums, only just ripened, were gathered. At the Gardens there was a fine display of autumn tints on trees and shrubs, when further growth had ceased owing to the colder weather, and these continued for a longer spell than usual.

November.—In this month there were two distinct spells of unusually mild but unsettled weather, one at the beginning and the other at the close of the month. November is seldom a brilliant month, and this year it was fairly true to type in that respect, being damp, dull, and misty for the greater part; but fairly mild and with quite an average amount of sunshine. The middle of the month was, however, cold and foggy, and occasionally there were some sharp frosts; but snow and other frozen precipitation was only seldom experienced. The winds were again mainly from southerly and westerly points, and winds from a northerly quarter were rarely felt. The only frosts were those that occurred at night, when the thermometer on the ground, fully exposed to the sky and to terrestrial radiation, sometimes fell very low, and sharp ground-frosts were the result. The rainfall of the month was generally less than is usual in November; but in the northern parts of the kingdom, and also in North Wales, some very large downpours were recorded.

December.—The chief features of the weather of this month were its abnormal mildness, combined with much wet weather—conditions which were due to the fact that westerly and south-westerly winds blew with great persistency all through the month, quite dominating the weather all over the United Kingdom. In many districts more or less rain fell on two out of every three days right through the month, and in some parts of the British Isles the aggregate fall far exceeded the normal amount; indeed, in not a few instances daily amounts were reported considerably in excess of any previous maxima on record for the district the station represents. Temperature was in excess of the normal over nearly the whole of the kingdom, and in not a few localities daily maxima were registered higher than any previous maxima of which a record has been preserved for the district. In some districts the mean temperature for the month was quite ten degrees above the normal, and in a few instances maxima were observed in excess of any recorded during the preceding thirty years. As illustrating the general condition of things in the west, an observer on the fringe of Dartmoor reported that, although other Decembers had brought more rain, yet, in his many years' experience, he had never known anything like the ceaseless downpour of the last six weeks of the year. With such a record of rainy weather the small amount of sunshine recorded everywhere was only what might have been expected, and in many parts of the kingdom the deficiency was very marked. As examples of this, some counties in the northern half of England had only ten, seven, and even three hours of sunshine registered in the whole month—amounts which, it need scarcely be observed, are greatly below the average for the month.

DRY ZONE AFFORESTATION AND RECLAMATION OF WASTE LAND.

DELHI AND ITS WORKS.

By A. E. P. GRIESSEN, F.R.H.S.

IN 1902—a decade before the ancient capital of the Moghuls was restored to its pride of place as the coronation gift of the KING EMPEROR—Lord CURZON, then Viceroy and Governor-General of India, invited an expression of opinion on the possibilities of reafforesting the Northern Ridge of Delhi, which, at the time, formed the boundary of the Civil Lines.

There were not wanting indications that the original flora of this historic portion of the ridge had, for strategic reasons, suffered considerably during the Relief of Delhi. Besides, owing to the free exercise of grazing rights, or rather to the limited restrictions against grazing, and the close proximity of the ridge to the city, it was repeatedly depleted by cattle. The presence, however, of a few young trees seemed to suggest that the local authorities had paid some attention to its possible restoration, though no definite scheme had been formulated.

My own special duties in connexion with the preparations for the Great Coronation assemblage left me but little leisure for an inquiry of this nature, but I undertook a general survey of the ridge and ventured to suggest that much could be done by protecting the entire area, and not only allowing Nature to do its work, but supplementing Nature's work with a planting scheme aiming at the utilization of all natural depressions, where vegetable mould had collected, for planting operations. Several pits were then excavated to ascertain the possibilities of the suggestion, and it was found that the idea was practicable. Beyond this, very little was then attempted, as the Durbar works claimed all my time and attention, and after the Durbar the idea was left to the local authorities to develop.

At the same time inquiry was made into the questions of reclaiming the barren land outside the Northern City Wall. The soil was strongly impregnated with salts, and it was evident that little could be done in the absence of an abundant water supply. Failing this, it was suggested that improvement might result by treating the site so as to retain as much of the rainfall as possible, and thereby check the action of the salts, afterwards planting as a park with salt-resisting species.

An experiment on these lines was conducted in the plot bordering the Alipur Road just below the cemetery; and, though the result

was not immediately apparent, the present condition of the site is a very clear evidence of the success of the experiment, and demonstrates how even the most barren wastes may be reclaimed. It is probable that most of the *Thevetia neriiifolia* ('Pila Kanar') occurring there were planted in 1902.

In recent years, with the advent of the canal, the land between the Kashmir Gate and Sabzi Mandi has been transformed, thanks entirely to the exertions of the present garden superintendent, Mr. R. N. OCKE. Where nothing would grow, a wide expanse of turf now covers the saltpetre tract which formerly presented such a desolate appearance, a practical demonstration of the reclamation of brackish land when soft water is available in abundance.

Having again been specially deputed for duty in connexion with matters relating to the Coronation Durbar of 1911, many of the inquiries made on the occasion of the former Coronation assemblage claimed attention and formed the subject of interesting discussions. Subsequent events, which led to His Majesty the KING EMPEROR proclaiming Delhi as the future Capital of India, necessitated the examination of the former suggestions, and though the area selected for the New Capital lies to the south of the present city of Delhi, the Northern Ridge has retained all its former interest.

It formed originally the limits of the old Civil Lines, and it was beyond that ridge that the historical Durbar of 1877 was held, the same site being selected by Lord CURZON for the Coronation assemblage held during his viceroyalty, and again by Lord HARDINGE for the Coronation Durbar of 1911.

In the selection of a site for the New Capital, sentiment favoured the Durbar area, but a close survey of the surroundings soon proved it to be utterly unsuitable for the purpose, and on the southern site of the present Delhi, over the ruins of so many Delhis of the past, the New Capital is rising as a monument to commemorate the benefits of British influence over this vast Empire.

Here again, the New City has its western boundary, the continuation of the Delhi Ridge, known as the Southern Ridge. This natural feature bordering the city on the west forms a most suitable background. Extending in a southerly direction, it dominates the entire surrounding country, but, being devoid of vegetation, it presents a most barren aspect. The idea of afforestation naturally came into prominence and called for the immediate attention of the authorities concerned, the matter assuming concrete form in 1912-13, when a Forest Officer of experience was deputed to frame a scheme. Having also been approached on the subject, I paid a special visit to Delhi and surveyed the site with a view to ascertaining what may have been its original flora.

The remains of the following species which may have formed its original flora were traceable. In the rocky interstice, where nothing would seem to be able to thrive, remnants of *Carissa spinarum*, a dwarf species of 'Karonda,' *Butea frondosa* ('Dhak'), with *Cordia*

mixa ('Lasōra') could be traced. *Capparis aphylla* ('Karil') and *C. horrida* ('His') occurred quite freely in the company of *Zizyphus nummularia* ('Ber'), these last species evidently not appealing to cattle. On the eastern slopes, wherever the erosion was not severe, small pieces of *Tecoma undulata* ('Lohūri') were also found, with traces of *Diospyros montana* ('Pasendu'). The last species seemed to have been repeatedly eaten up, as only stem crowns could be seen. *Clerodendron phlomoides* ('Urni') appeared the most common plant throughout the ridge, and there is no doubt that at one time it must have formed the main undergrowth. On the tableland remnants of *Wrightia tinctoria* ('Dhūdi') had survived, and on its western slopes, near Dasghara, a small solitary remnant of *Olea cuspidata* ('Khivan') was found. This interesting find induced me to continue my search, but, as the result proved, it was the only specimen of wild olive there. Suckers of *Crataeva religiosa* ('Bharna') clearly indicated that the species prevailed in large forms in years gone by. A few *Acacia arabica* ('Kikar') and *A. ferruginosa* ('Kaiger') seemed to complete what appeared to be the bygone flora of the ridge. The absence of *Ficus religiosa* ('Peepal') and *Melia Azadirachta* ('Neem') may perhaps be due to the attraction they offer, in their young state, to porcupines.

My proposals for the reafforestation of the Southern Ridge, therefore, remained on the results of my earlier investigations, the object being to revive the original flora, supplemented by the introduction of allied species that would grow under identical conditions of climate, soil, &c. But, for the successful working of the scheme, it was imperative that the entire area should be fenced in so as to afford the necessary protection from cattle.

Before proceeding any further, it may not be out of place to say a few words about the formation of this ridge and the climatic conditions prevailing. The ridge in question may be said to lie in a south-westerly direction, and at its highest point dominates the city area, and when afforested and opened out with a system of drives the entire city will be seen. Besides its æsthetic effect and the beneficial influence on the atmosphere, it will check to an appreciable extent the effect of sand-storms &c.

The ridge is a quartzite rock, rising abruptly from the alluvial plain. It may be subdivided under three distinct heads: (1) the soil rock which presents no fissures to speak of and denuded of deposit of any kind; (2) the softer layer, chiefly composed of a porous quartz in a state of disintegration; and (3) the tableland which collects the erosion from the upper rocky layers where a small deposit of soil has collected.

Under the first very little can be attempted, as it would necessitate expensive blasting operations which would in very few instances break the rock beneath sufficiently to admit of roots finding their way to any depth; (2) and (3) afford possibilities of success, and these are being utilized for the afforestation operations hitherto conducted.

The average rainfall of Delhi seldom exceeds 27 inches. the chief

falls being in July and August. If from this is deducted the early monsoon and cold weather rains, which rarely exceed 4 inches, a balance of 23 inches is the rainfall proper. Of this comparatively poor average, half, owing to storms, benefits the ridge but little, as the rain washes away everything and brings about the erosion which has been the chief cause of denudation, carrying away each time whatever deposit has been formed by heavy sand-storms.

The extremes of temperature are also very great. In the summer 115° F. is but a common record in the shade, whilst in the sun the ridge rock becomes so heated that, by 10 o'clock during the summer months, it is impossible to walk on it. On the other hand, in the cold weather, the temperature often drops to 22° F., which is sufficiently cold to destroy numberless young seedlings.

The prevailing north-west hot winds that blow across the ridge during May and June can be compared with the Algerian sirocco, and, coupled with the radiation of heat from the exposed rocks, makes plant life very difficult to establish.

Besides the adverse climatic conditions prevailing, which cause a large percentage of mortality amongst newly planted trees, porcupines, hares, and rats account for the destruction of fully one-fourth of the seedlings, while white ants, always active in a new site brought under cultivation, are equally destructive. The grazing nuisance has been partly checked by fencing in all the sites and proclaiming them as Reserved Forest Area.

Two distinct methods of afforestation were originally suggested, one based on experience already gained, aiming at making use of natural depressions or pockets for planting or sowing operations; and the other, the ambitious terrace system, which aimed at terracing portions of the ridge and creating artificial tablelands by covering the rocks with clay brought from below (fig. 1). The latter method always appealed to the practical mind as a Utopian undertaking not justified by the expenditure it involved. It must of course be admitted, if funds were plentiful, that it would be the quickest way of reafforestation, and that it would greatly help to stop or check the erosion and retain the greatest portion of the rainfall for the benefit of the plantations, each terrace being made to retain its own rainfall plus the drainage of the hill area above. But the experiments conducted have proved prohibitive from a financial point of view, and yet the advantages it afforded for direct sowing, whenever the weather permitted, enabled young seedlings to gain the subsoil before the dry season set in. It must be admitted that this method would enable the ridge to be clothed with vegetation very rapidly, and I have no doubt that within five or six years, water being made available in sufficient quantity, the whole ridge could be so covered that no rock would be visible. This system is, however, for the time being, kept in abeyance, and I doubt whether it will ever be adopted in ordinary circumstances.

The method adhered to is, what may be termed, the natural

system, as was originally suggested for the northern ridge. This consists, as already partly described, in making use of all natural depressions wherever earth is being deposited and not subject to erosion. Natural depressions or pockets are excavated three to four feet in diameter if the surrounding rocks permit, and to corresponding depth if possible, wherever porous disintegrated stone is found, the pit (see diagram A) is dug out and refilled with clay from below.

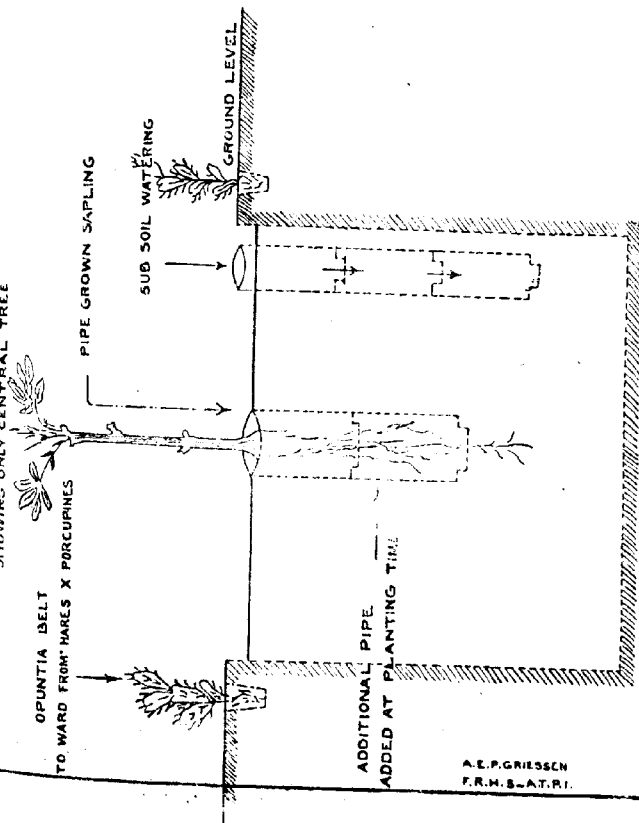
The pits or holes are excavated on an average 25 feet apart, which gives an average of seventy pits to the acre. Each of the pits is planted with a hardy pot- or pipe-grown tree, supported by three hardy similarly grown undergrowths, and beneath them again seeds of hardy species are sown at the beginning of the rains. It will be seen that each pit really accommodates four nursery-grown saplings. The process was arrived at after repeated failures to get seeds to germinate and thrive when afforestation was to be conducted by sowings. In many instances the main tree or one of the undergrowths thrives indifferently, but what actually remains meets the objects aimed at. There is no doubt that a certain amount of thinning out will have eventually to be done, but this will not be necessary for years, as the rate of growth under such adverse conditions is relatively slow. It may be added that most of these pits are surrounded by *Opuntia Dillenii* (fig. 10) as a protection against porcupines and hares; rats are easily disposed of with arsenic, and as to white ants—there is very little to be done as a protective measure—the best is to eliminate the species that are usually attacked by them.

Ravines (see diagram p. 105) will have to be gradually trained to stop as much as it is practically possible the "run off" by a series of bunds that will eventually prevent the disintegration of the sides and collect the erosion from the upland, thus eventually forming so many small tablelands. The sides of these ravines being in some cases almost perpendicular, it is proposed to clothe them with succulents such as Aloes, Agaves, Fourcroya, Euphorbia, and *Opuntia*, which are gradually being collected and grown for the purpose. These ravines, when established, will create a most pleasant contrast. It may be interesting to record that, without artificial watering, it would be an impossibility to carry out the work in the time it ought to be completed, and it would be best to leave Nature to do its work, though it may take half a century or more.

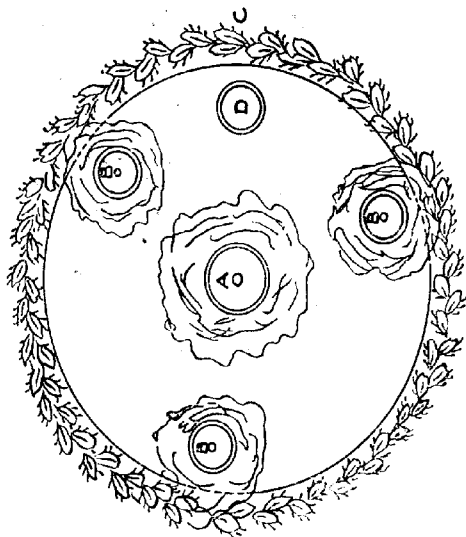
The method aimed at, is to tend these plantations for a period of four or five years (according to their position), by which time the vegetation should be sufficiently established to thrive by itself. These artificial waterings will gradually diminish; so that by the end of the fourth or the fifth year, as the case may be, when the monsoon sets in, the vegetation will be left to thrive by itself.

The distribution of water is, of course, one of the most difficult problems. Take, for instance, the watering of tree-pits at the rate of seventy an acre, amongst rocks and thorns over an area that will eventually cover approximately 2,500 acres. This will convey an idea of the

SECTIONAL DIAGRAM OF A 4' DIAMETER
PLANTING PIT
SHOWING ONLY CENTRAL TREE



PLAN OF A 4' DIAMETER PLANTING PIT
SCALE 1/8" = 1' - 1" INCH



REFERENCES

- A. CENTRAL TREE
- B. UNDER GROWTH SAPLINGS
- C. OPUNTIA PROTECTIVE BELT
- D. INLET OF SUB SOIL WATERING PIPE

labour the work involves, and when the ridge is afforested and gives the æsthetic touch to the New Capital which I believe it will, it will be difficult to realize the enormous efforts of the original undertaking.

Water is pumped and made available at one of the commanding points of the ridge and is taken into a main pipe feeder which follows as nearly as possible the contour level at which it is made available, minus, of course, the absolute necessary hydraulic grade to overcome friction.

Branch lines every 500 to 600 feet apart, or according to the configuration of the hillside, take water down the ridge slopes. Small cocks 200 to 300 feet apart enable water-carriers (*bhishties*) to fill their leather bags (*mashocks*), and the furthest distance these leather bags have to be carried seldom exceeds 300 feet or twelve lines of pits on either side of branch lines.

These afforestation operations were originally started on a tentative scale during 1914-15, when an area of 52.40 acres was treated on the natural system described. Prominence was given to sowing, with the unreliable result alluded to before, and it soon became evident that the only practical solution was the planting of nursery-grown saplings.

It is not that the seeds sown did not germinate, but, with the advent of the winter, most of the seedlings died owing to inadequate root action, the dry and cold season setting in before the roots could get deep enough to nourish the plants. It must also be said that the area originally selected for this tentative trial was, on the whole, not exactly suitable for the purpose.

Simultaneously with the above, a tentative trial on the terrace system was also made, covering actually an aggregate area of 4.55 acres. Sowings in furrows were resorted to and proved what has already been advanced on the subject in these notes. The success here is attributed to a uniform depth of good soil with an even moisture of surroundings, which it is impossible to attain with isolated pits some 25 feet apart. A reference to the photograph (fig. 9) will convey a better idea than pen can describe; a few nursery-grown saplings were also planted in the furrows, and these have already attained, comparatively speaking, to a large size, if the environments are taken into consideration.

The land between these terraces, representing approximately 16.45 acres, was also afforested, but on natural lines. The aggregate area treated during 1914-15 represents 73.40 acres, this acreage gradually developed by the warding staff to 103.40 acres as water could be spared. Further extensions were undertaken last year on the north and south of the old plantations, and these will represent an approximate acreage of 134 acres, which, added to the original work, brings the total area under afforestation work to 237.40 acres. It will be seen from the above that it represents a very small part of the whole of the 2,500 acres that really face the New Capital.



FIG. 9. TERRACE AFForestation (SEE SUBSOIL ROCK COVERED WITH THIN
LAYER OF SOIL) SHOWING ARTIFICIAL TERRACING OF HILLSIDE.
(Planted 1916)

176,600 ft. 100.



FIG. 10.—A PLANTED PIT SHOWING A LEAFLESS BOMBYX IN THE CENTRE SURROUNDED BY THREE ACACIAS AND A RING OF OPUNTIA AS A PROTECTING BELL. (See inlet of subsoil watering pipe.)



FIG. 11. TREE-GROWN SAPLINGS. ENCOURAGING DEEP
ROOTING.
(LEFT TO RIGHT: *MIMOSOPS* *ELIENGI*, *TAMARINDUS*
INDICA, AND *MIMOSOPS* *KAURII*.)



FIG. 12.—RECOVERY OF DHAK (*BUTEA FRONDOSA*) THROUGH PROTECTION BY FENCING A "RESERVED FOREST AREA."

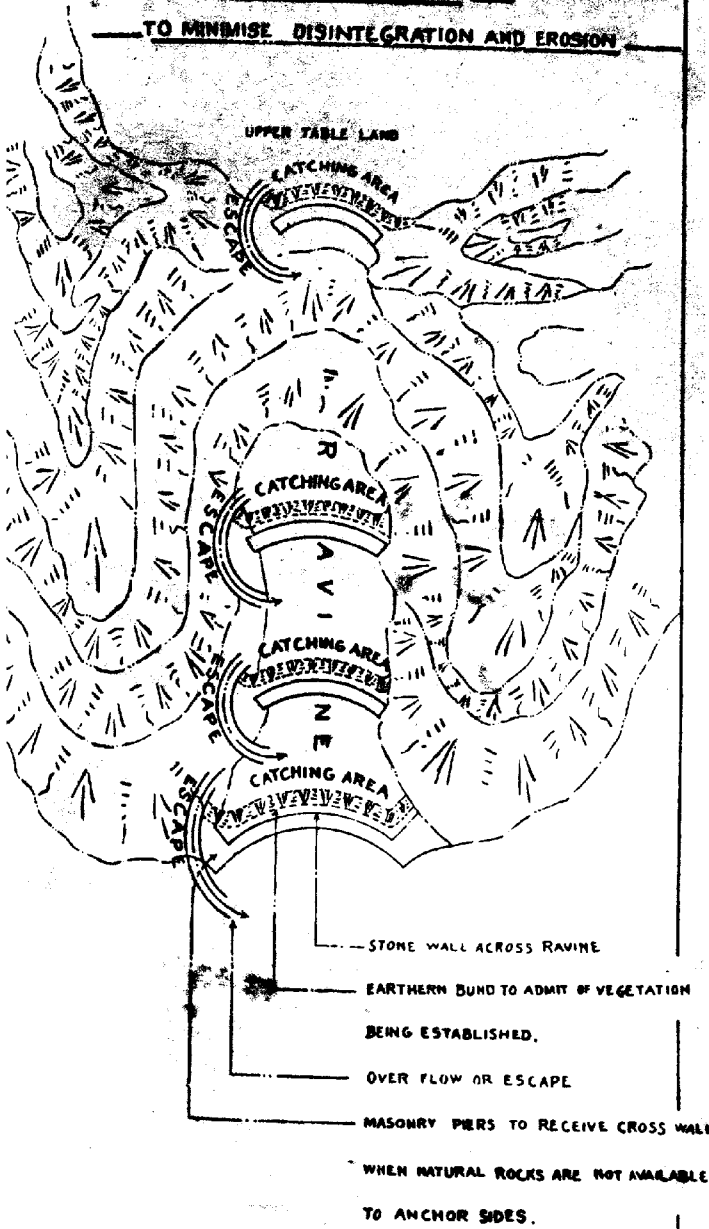


FIG. 13.—RECOVERY OF "AMALTAS" (*CASSIA FISTULA*) SURROUNDED BY ARMED SPECIES SUCH AS *CARANDAS*, *CARISSA*, *DIOSPYROS*, *FLACOURTIA*, *TECOMA*, *ZIZYPHUS*, ETC. THE RESULT OF FENCING A FOREST AREA.

(See face p. 12)

TRAINING OF RAVINES

TO MINIMISE DISINTEGRATION AND EROSION



A.E.P. GRIESSEN
P.R.M.S.-A.T.P.I.

Subsoil Watering.—Experience has demonstrated that surface watering has great drawbacks in the maintenance of an undertaking of this magnitude, evaporation being so great that, before water percolates into the subsoil by surface watering, the bulk is evaporated. To overcome this difficulty, the only alternative was to resort to subsoil watering by means of earthen pipes placed perpendicularly into planting pits. These pipes vary in diameter from 3 to 4 inches, and when filled with water convey to the subsoil their respective contents. This has the great advantage of inducing by capillary attraction a deep root action; whatever quantity of water is so given is conveyed some three feet beneath the earth as shown in the diagram on p. 103.

Once roots have reached a depth of three feet they eventually search for fissures in the rock, and the plantation is practically safe from surface drought. This contrivance is only suggested for dry track or torrid zones as occur in Upper India; it would be quite unnecessary in moist tracks, where the subsoil always contains a great percentage of moisture, which, by itself, is sufficient to attract a deep root action.

Preparation or Growing of Saplings for Dry Zone Afforestation.—

It will be noticed that all dry zone vegetation is characterized by deep rooting. The hardier the tree is, the more powerful may be said to be its root action. Dry zone trees, as a rule, are somewhat slow to grow in their young stage, and they usually mature their seeds during the hot season, which enables them to fall to earth, to be blown by prevailing high winds into recesses and depressions in sheltered positions. With the advent of the rains, water usually collects in small quantities in these depressions and enables the seeds to germinate, but, after the rains are over and dry winds recur, the ground gradually dries up and it becomes a question how to meet this first struggle. It will be observed that many species practically die down to ground level, and it is at that critical period that the foundation is laid for their future. Practically speaking, only the root system remains, and during the cold weather months, and the following year's dry season, these roots shape themselves and suddenly throw out shoots, sometimes far more vigorous than those which a plant that had not to undergo the same hardship could do.

It will be readily seen from this that the raising of suitable dry zone trees for afforestation work of this kind calls for more attention than at first seems necessary. Growing in open nursery beds of trees that will eventually have to be transplanted into exposed forest tracts does not succeed with all species. No growing of tap-rooted species should ever be attempted in nursery beds, they should be grown in deep pots or pipes. The latter has proved very successful indeed and has the double advantage of admitting a deep rooting from the beginning (fig. 11). At the time of planting, another pipe of similar size filled with good earth can be placed below the pipe in which the sapling has been grown. This will induce the roots already made to continue their downward growth more rapidly.

These small earthenware pipes, being very porous, soon perish, and so everything possible to help the saplings can be considered to have been done. The pit thus planted, being provided with the subsoil watering contrivance above referred to, tends to favour deep rooting, and this is the real secret of success in dry zone afforestation works.

The illustration showing the sectional diagram of a dry zone planting pit with subsoil watering pipe (diagram p. 103) conveys as accurately as can be described the work involved in an afforestation scheme of this nature, viz. 70 main trees and 210 undergrowth or 280 nursery grown saplings to the acre. During the past two years approximately 152 acres have been treated, which represents handling of 42,650 saplings, everyone of them a pot- or pipe-grown plant. If to this is added 8 to 10 per cent. for damage in transit (as each sapling has to be carried across rocks to its position), it brings the total from 45,965 to 46,821, including planting casualties. There is also the inevitable mortality from stray animals, from prolonged periods of drought when water is not available, and from such pests as porcupines, hares, and rats, which are active during the dry season and in the winter months.

The mortality from all causes can be put down during the first years at 25 to 30 per cent., which shows that a work of this description could not be attempted without a nursery run on practical lines.

The protective belt of *Opuntia* planted around each pit (fig. 10) also involves a considerable amount of work, the bulk of the requirements having to be collected and brought from distances varying from one to three miles. Unlike the Northern Ridge this site possesses only a few stray specimens of the species, and to anyone who realizes what it means to handle cart-loads of such prickly plants the magnitude of the task will be apparent.

Ravine Training to check Disintegration and Erosion.—The training of ravines is another important factor in an undertaking of this kind; they are usually the result of the disintegration of the rock caused by the "run off," which again is the cause of the erosion that should be brought under control as much as possible. There are, of course, many points involved that govern the treatment to be applied; in some cases it may be almost impossible to devise a ravine training scheme that would dispose of the "run off," as the area actually drained by a ravine has to determine the precautions to be taken.

Some years ago, when the writer conducted the ravine training scheme necessary for the making of the Macdonnel Park at Agra, he was faced with earthen ravines varying between 100 to 250 feet wide, and the scouring that annually took place undermined the adjoining land to such an extent that the sides became almost perpendicular. Each storm gradually undermined the sides, and slices of earth would get detached from the main body, temporarily blocking the outflow and causing extensive damage, choking drains and culverts, and sometimes cutting across metalled roads.

The first problem was to ascertain the acreage or area drained by these ravines, then to divert the drainage in such a way as to divide it proportionally through the various existing ravines. Then came the huge bund treatment which was to check the "run off." Lakes were thus formed during the rains, and each reservoir or catching area had to be provided with a safety outlet or escape so as not to imperil the whole scheme, each catching area becoming a lake after its superimposed one had been filled, and this procedure had to be followed till the overflow of the entire system was made to run into the river.

Large quantities of rainfall were so retained, the gradual silting up of the beds of these ravines or lakes went on with remarkable rapidity. Similar operations were also conducted within the Government Grass Farm Lands, and in less than five years the topography of the place had changed.

Permanent lakes combining beauty with utility were then made, and these now collect most of the rainfall, the upper lake discharging into those on the lower levels, which beds have been so designed as to make use of every drop of water for irrigation of low-lying grounds. When these lakes are emptied, they are fed from the canal, and are a component part of one of the most effective Park irrigation schemes met with in India.

The difference of levels between the feeding minors and the lakes is utilized to work several sets of hydraulic rams that force water to the high ground, enabling over 75 acres of highland to be irrigated.

A similar treatment of ravines was also conducted some twenty-five years ago at the Allahabad Grass Farm. Hence, we have object-lessons that should be generally applied throughout Upper India.

On the Southern Ridge the training of ravines should in the first instance aim at retaining the "run off" from all tablelands, and this can be easily done by providing against the heaviest recorded rainfall that may have taken place over a certain number of years. The heavy downpour experienced during the year of the last Durbar, which amounted to about 8 to 9 inches in 36 hours, may be taken as a basis; this, with the area draining on the tableland or particular catching area, would determine the height and relative position of the protective cross bund or bunds. It will be understood that the above will lead to most of the upland "run off" being disposed of at once and retained at its highest possible level, relieving the ravine beneath. The diagram on p. 105 illustrates the above. It will be seen that the second cross ravine bund has a comparatively small strain and so on till the position of the last cross ravine bund, which will be found necessary, is determined.

In this particular case these cross ravine training bunds are made of dry stone walling, but it is a question whether it would not be more economical to make them in lime masonry and convex against the flow of water (this is the distinction between stone or masonry bunds and earthen ones). A comparatively small section should in some cases suffice to resist the inrush of water, but stone being abun-

dant, these bunds may be made as pitching, but they should be so built that the weight of water or earth at their back would close their joints and make them stronger.

It is imperative that the position of these bunds be properly selected and their foundation embedded into the sub-rock or resting against a cross rock, if existing, so that the base will not give away. As to the sides, they should be anchored against natural rocks, and here, also, the necessity of providing side escapes should not be overlooked (see the arrow on the diagram on p. 105), as they will act as safety valves, taking the excess of water (if necessary) away through a rocky course and not endangering or undermining the newly-constructed protective bund. Though conditions differ according to position &c., yet the principles remain the same.

In some places the inrush of water may not be controllable before it reaches almost the foot of the ridge. Here, I would say, after making provision to catch the product of the erosion, a masonry fall may lead the surplus water to the drain below, thus checking as far as possible the disintegration that takes place year by year in some of the low-lying ravines of the western slopes. Practically the first step in this matter would be, not to attempt the treatment of the ravines proper, but the uplands where the ravine actually begins. This is the common practice resorted to by hillmen. Subsequently the ravine cross bunds could be dealt with where necessary.

In the process of time, these catching areas will gradually get filled up, creating more or less level tablelands which will accommodate a sturdy deep-rooting vegetation, which will play an important part in binding together the silt deposited by the erosion of the hillsides above. Very little will eventually be gained by raising the level of these cross bunds, unless it is for further check, aiming at retaining the rainfall, but there is a limit beyond which one may not with safety go. Each tableland will by its natural formation absorb the great percentage of the rainfall it will receive, and subsequently induce percolation into the hillsides.

A great deal could be written on the subject, but it is hoped that the day will not be distant when the above can be practically demonstrated.

Nature's Revival.—The actual revival of its original flora is a striking example of Nature's power of recuperation. This, of course, only refers to certain portions of the area which are somewhat distant from the vicinity of the old city, where cattle grazing and the destruction of the scrub vegetation for fuel purposes has not been so systematically carried out.

The two photographs illustrating Nature's revival (figs. 12, 13) should convey an object-lesson of the conditions under which plant life makes way in adverse circumstances. In most cases the armed species must have grown first, and subsequently, in their midst under the influence of their protection and shelter, other species, which are usually attacked in their young state by such pests as porcupines and hares, have found a safe and congenial place; in other parts, between fissures

of rocks, where the young seedlings were protected from the ravages of stray animals, the old crowns and roots have survived and now show signs of vigorous growth.

A reference to the photographs already mentioned, though these are not very clear, shows the composition of some of these natural groups. Most of the species traceable are remarkable for their deep rooting. Notable amongst these are two species of *Capparis*, viz. the 'Karil' and the 'His'; and the *Carissa spinarum*, or wild 'Karonda,' which must have been repeatedly cut down to ground level for fuel. The last species may take years to revive, but is springing up in many places; in fact, during the past two years some of these plants have begun to fructify. Then we have the 'Pasendu' (*Diospyros montana*), which has made a wonderful recovery. The 'Lohūri' (*Tecoma undulata*), which is a species difficult to raise under cultivation, in this part of India is coming up freely. A species of 'Grewia' (*Phalsa*) has been traced, and not less remarkable is the recovery of the 'Dhak' (*Butea frondosa*) and the 'Amaltas' (*Cassia fistula*). With the advent of this afforestation work and the proper warding of the area, it will be possible in a few years to reconstruct the entire original flora of the site.

What Nature has already demonstrated.—Besides the wonderful recuperative power of Nature alluded to in the revival of the original flora of the ridge, it may not be out of place also to record the newly-planted species that have already fructified. This will go a long way to demonstrate the adaptability of certain species to these environments.

The following species have already fruited :

Melia Azadarach	Bakain.
Terminalia arjuna	Arjun.
Prosopis juliflora	Mesquite bean.
Acacia Farnesiana	Sweet-scented Babool,
Dalbergia Sissoo	Shisham.
Thevetia nerifolia	Pila Kanar.
Dadonia viscosa	Rallia.
Parkinsonia aculeata	Christ Thorn.

The tendency to fructify demonstrates their adaptability for the purpose, and will lead to the introduction of allied species which will greatly enhance the interest of the plantations. It will only remain for us to read and to comprehend that wonderful book which Nature provides us and to make use of its interesting contents.

Owing to the impossibility at present of working out an annual programme, it is extremely difficult to know in what proportion the stock of plants is to be raised. Many of the species used have to be planted out the first year, otherwise they become potbound, are expensive to maintain, and when planted out they have lost their first vigour. Let us hope that, now the great world conflict is over, it will be found possible to adhere to a regular annual programme, when we shall be able to give to our New Capital the dominating green and restful horizon contemplated.

ORIGINAL FLORA OR VEGETATION OF THE DELHI SOUTHERN RIDGE.
TRACED IN 1912-13.

*1. <i>Acacia arabica</i>	Kikar.
*2. <i>Acacia ferruginosa</i>	Kaiger.
*3. <i>Butea frondosa</i>	Dhak.
4. <i>Capparis aphylla</i>	Karil.
5. <i>Capparis horrida</i>	His.
6. <i>Calotropis procera</i>	Ak.
7. <i>Carissa spinarum</i>	Karonda.
8. <i>Clerodendron phlomoides</i>	Urni.
*9. <i>Cordia mixa</i>	Lasōra.
*10. <i>Crataeva religiosa</i>	Bharna.
*11. <i>Diospyros montana</i>	Pasendu.
12. <i>Khretia laevis</i>	Koda.
*13. <i>Olea cuspidata</i>	Khiwan.
*14. <i>Tecoma undulata</i>	Lohūri.
*15. <i>Wrightia tinctoria</i>	Dhūdi.

* Species that are being reintroduced.

SPECIES INTRODUCED THAT ARE DOING WELL.

1. <i>Acacia Farnesiana</i>	Vilayati Babool.
2. <i>Acacia modesta</i>	Polosa.
3. <i>Albizia amara</i>	Lallei.
4. <i>Albizia Lebbeck</i>	Siris.
5. <i>Anegissus pendula</i>	Dhao.
*6. <i>Bombax malabarica</i>	Samal.
7. <i>Dadonia viscosa</i>	Rallia or Sonatty.
8. <i>Dalbergia Sissoo</i>	Shisham.
9. <i>Kigelia pinnata</i>	Mozambique sausage tree.
*10. <i>Melia Azadarach</i>	Bakain.
11. <i>Parkinsonia aculeata</i>	Christ Thorn.
12. <i>Pongamia glabra</i>	Papar.
13. <i>Prosopis juliflora</i>	Mesquite.
14. <i>Opuntia Dillenii</i>	Nagphana.
15. <i>Tecoma stans</i>	
16. <i>Thevetia nerifolia</i>	Pila kanar.
17. <i>Tithonia speciosa</i>	
18. <i>Ulmus integrifolia</i>	Papri.

* Species to be protected from porcupines.

SPECIES INTRODUCED THAT GROW INDIFFERENTLY.

1. <i>Bauhinia purpurea</i>	Kolar.
2. <i>Bauhinia racemosa</i>	Kachnal.
3. <i>Bauhinia variegata</i>	Kachnar.
*4. <i>Casuarina equisetifolia</i>	Beef wood.
5. <i>Celtis australis</i>	Jagho.
6. <i>Erythrina indica</i>	Pangra.
7. <i>Eucalyptus</i> of sorts	Blue Gum.
*8. <i>Ficus infectoria</i>	Pilkhan.
*9. <i>Ficus glomerata</i>	Gular.
*10. <i>Ficus religiosa</i>	Peepal.
**11. <i>Inga dulcis</i>	Vilayati Imli.
*12. <i>Melia Azadirachta</i>	Neem.
13. <i>Millingtonia hortensis</i>	Neem chameli.
14. <i>Zizyphus jujuba</i>	Bera.

* Species repeatedly attacked by porcupines.

** Species repeatedly attacked by white ants.

NEW SPECIES THAT ARE BEING INTRODUCED.

1. <i>Acacia Catechu</i>	.	.	.	.	Kair.
2. <i>Acacia latronum</i>	.	.	.	.	Bhes.
3. <i>Acacia rupestris</i>	.	.	.	.	Khor.
4. <i>Ailanthus excelsa</i>	.	.	.	.	Arua.
5. <i>Aloes</i> of sorts.	.	.	.	.	Succulent plants.
6. <i>Anona squamosa</i>	.	.	.	.	Sharifa.
7. <i>Cassia fistula</i>	.	.	.	.	Amaltas.
8. <i>Caesalpinia coriaria</i>	.	.	.	.	Devi-Devi.
9. <i>Crystostegia grandiflora</i>	.	.	.	.	Dhudee.
10. <i>Fourcroya gigantea</i>	.	.	.	.	Succulent.
11. <i>Gardenia turgida</i>	.	.	.	.	Thanella.
12. <i>Jatropha Curtas</i>	.	.	.	.	Safed ind.
13. <i>Manihot Glaziovii</i>	.	.	.	.	Ceera rubber.
14. <i>Phoenix sylvestris</i>	.	.	.	.	Khajoor.
15. <i>Prosopis spicigera</i>	.	.	.	.	Jand.
16. <i>Punica Granatum</i>	.	.	.	.	Sharifa.
17. <i>Tamarindus indica</i>	.	.	.	.	Imli.

SEEDLING DAFFODILS SELECTED TO GROW ON AT BRODIE CASTLE.

By IAN BRODIE, of Brodie.

WHEN I first began to grow Daffodils (it was in 1898), I had no sort of guide to tell me what flowers to grow, or, when grown, how they should best be mated so as to produce children who would be a credit to their parents (and to their godfather). I worked entirely in the dark, blindly feeling my way. The result was that, for some years after the seedlings began to bloom, I searched in vain for a flower that could really be called a flower. Things are better now, but still a beginner requires help; and it is in the hope that the following notes may be of some use in that direction I have had the temerity to send them for publication. I have added, at the end, a short list of more or less inexpensive varieties which I have found useful for breeding; but in case the novice is more ambitious the following are also very good as parents:

Monarch.	Miss Clinch.	Lord Kitchener.
Ben Alder.	Vestal Virgin.	Hypatia.
Mrs. Ernst Krelage.	Morven.	Emerald Eyc (pollen).
White Emperor.		

- 48/11=Bernardino x Poet—very good; the cup has a wire edge of red.
 93/11=Great Warley x Lord Kitchener—very large Leedsii.
 107/11=23/06 (King Alfred x Weardale) x Felspar—bicolor Incomparabilis.
 230/11=Dorothy x Kestrel.
 262/11=Will Scarlett x Bernardino—three selected.
 288/11=Red Chief x Kingsley.
 320/11=358/02 (Cassandra x Bernardi var.) x Dark Red-crowned Seedling—the darkest bit of colour I have yet seen.
 354/11=691/05 (Mrs. Bowley x Will Scarlett) x Kestrel.
 398/11=793/05 (Cassandra x Recurvus Seedling) x 557/05 (Mrs. Bowley x Poet).
 421/11=Minnie Hume x Moonbeam.
 499/11=Minnie Hume x Empire.
 440/10=Aftermath x 662/04 (Lulworth x Virgil)—a large and much improved Aftermath.
 447/10=Beacon x 662/04 (Lulworth x Virgil).
 456/11=Moonbeam x Matthew Arnold—a tall pure white flower.
 451/11=Moonbeam x Seabird—a good flower, pure white with Seabird perianth; tall.
 340/11=261/05 (Santa Maria x Weardale) x Dark Yellow Ajax Seedling.
 307/11=Cassandra x Creole (Princess Mary x Will Scarlett).
 145/11=Minnie Hume x Lemon Star.
 523/12=254/08 (Comus x Barrii var.) x Socrates—two selected.
 272/12=Giraffe x Bernardino—two selected, one a Leedsii and the other an Incomparabilis.
 131/12=23/06 (King Alfred x Weardale) x 48/05 (M. J. Berkeley x King Alfred)—two selected; tall and very large and decorative yellow Ajax.
 607/12=557/05 (Mrs. Bowley x Poet) x Matthew Arnold.
 671/12=Oliver Goldsmith x Hildegard.
 484/12=358/02 (Cassandra x Bernardi var.) x Socrates.

- 313/12 = Pilgrim x Ben Alder (King Alfred x Lord Roberts)—a huge palest lemon Incomp.
- 99/12 = Florence Pearson x Mrs. R. Sydenham—good white Ajax.
- 269/12 = Mrs. Betteridge x Bernardino—a Giant Leedsii.
- 305/12 = Mme. de Graaff x Ben Alder (King Alfred x Lord Roberts)—a tall and very late Ajax of two shades of pale yellow.
- 117/12 = Lady M. Boscawen x Conqueror—a Giant Leedsii.
- 202/12 = White Knight x Empire—a Giant Leedsii.
- 128/12 = 66/06 (Santa Maria x King Alfred) x Seedling (M. J. Berkeley x K. Alfred).
- 95/12 = Ben Alder (King Alfred x Lord Roberts) x Cleopatra.
- 361/12 = Marina x Hypatia—a good pale-eyed Barrii.
- 399/12 = Cossack x Socrates—good.
- 610/12 = Moonbeam x Hypatia—a white-flowered double with some green in the centre; very pretty.
- 275/12 = Mme. de Graaff x White Star—Giant Leedsii.
- 96/12 = 66/06 (Santa Maria x King Alfred) x Cleopatra—extra good yellow Ajax.
- 37/12 = 271/03 (Minnie Hume x Stella superba) x Conqueror.
- 201/12 = Van Waveren's Giant x Empire—Giant Leedsii.
- 147/13 = King Alfred x Mrs. Ernst Krelage—a good light yellow Ajax.
- 78/13 = Ben Avon x Mrs. Ernst Krelage—good yellow Ajax.
- 99/13 = Felspar x Empire—an extra good Leedsii; very large, and opens quite white from the start.
- 109/13 = Lemon Star x Mrs. Ernst Krelage—Giant Leedsii.
- 112/13 = Lemon Star x Mrs. R. Sydenham—six selected, all white Ajax and taller than Mrs. R. Sydenham.
- 732/13 = Snowshoe x Selected Pyrenean Poet.
- 703/13 = Oliver Goldsmith x Hildegard.
- 205/13 = Creole (Princess Mary x Will Scarlett) x Blood Red—good lat Barrii.
- 370/13 = Pale-eyed Seedling x Ivoryne—a pale-eyed Barrii.
- 319/13 = Beacon x Ben Alder (King Alfred x Lord Roberts)—two selected very good dark yellow self Incomps.
- 316/13 = 232/09 (Weardale x Bulldog) x Ben Alder (King Alfred x Lord Roberts)—good; very large yellow Ajax.
- 306/13 = Pilgrim x Yellow Ajax Seedling—good deep yellow Incomparabilis.
- 397/13 = 125/08 (Mrs. Betteridge x White Ajax) x Miss Clinch—late white Ajax.
- 649/13 = 557/05 (Mrs. Bowley x Poet) x Socrates—two selected.
- 464/13 = Weardale x Lemon Star—Giant Leedsii.
- 250/13 = 239/06 (King Alfred x Lord Roberts) x 290/07 (Lady M. Boscawen x K. Alfred).
- 248/13 = 122/08 (Mme. de Graaff x White Ajax) x Mrs. Ernst Krelage.
- 266/13 = Princess Mary x Masterpiece.
- 110/13 = Morven x Mrs. Ernst Krelage—two selected; good pale Ajax.
- 75/13 = 179/07 (Lady M. Boscawen x King Alfred) x Empire—EXTRA GOOD; a very large Incomparabilis of two shades of yellow.
- 138/13 = Morven x Empire—a Giant Leedsii.
- 101/13 = Loch Fyne x Empire—a large Leedsii.
- 283/14 = Socrates x 803/07 (Will Scarlett x Poet)—three selected.
- 341/14 = 557/05 (Mrs. Bowley x Poet) x Yeoman of the Guard.
- 348/14 = 401/10 (Dorothy Wemyss x Cassandra) x Hildegard—four selected.
- 418/14 = 400/09 (Comus x Acme) x 803/07 (Will Scarlett x Poet).
- 445/14 = 439/10 (Pale Seedling x Ethelbert) x Moonbeam.
- 457/14 = Snowshoe x Pinkie.
- 361/14 = 793/05 (Cassandra x Recurvus Seedling) x Kingsley—large Poet.
- 349/14 = 430/10 (Oliver Goldsmith x Acme) x Hildegard—extra good Poet.
- 45/14 = Lemon Star x White Emperor—Giant Leedsii.
- 339/14 = 324/10 (Bernardi var. x Poet) x Yeoman of the Guard—good; large flat eye of bright orange.
- 381/14 = 308/10 (Recurvus x Acme) x Red-crowned Seedling.
- 451/14 = 288/11 (Poet x 557/05 (Mrs. Bowley x Poet)) x Socrates.
- 136/14 = Findhorn (Mme. de Graaff x Lady M. Boscawen) x Nevis (White Ajax).
- 50/14 = 125/08 (Mrs. Betteridge x White Ajax) x White Emperor—two selected.
- 69/14 = King Alfred x Socrates—yellow Incomp.
- 185/14 = Pinkie x Hypatia—three selected; pretty pink-rimmed eyes.

- 124/14=Hon. Mrs. Franklin x Mrs. Ernst Krelage—three selected; large Giant Leedsii.
 301/14=164/09 (Minnie Hume x Weardale) x 126/08 (Weardale x Leedsii).
 269/14=Monarch x White Emperor—light yellow Ajax.
 281/14=Oliver Goldsmith x 803/07 (Will Scarlett x Poet).
 291/14=213/08 (Bernardi Seedling x Acme) x 803/07 (Will Scarlett x Poet).
 259/14=138/08 (Pale-eyed Seedling x Ariadne) x Emerald Eye—a beautiful flower of the Emerald Eye type, but ten days earlier.
 182/14=King Alfred x Moonbeam—a lemon self Incomparabilis.
 122/14=Loch Fyne x Mrs. Ernst Krelage—a large Giant Leedsii.
 135/14=156/09 (Minnie Hume x King Alfred) x Nevis (White Ajax)—good Giant Leedsii; three selected.
 126/14=Bernardino x Mrs. Ernst Krelage—two selected; Giant Leedsii.
 211/14=Minnie Hume x Mrs. Ernst Krelage.
 76/14=179/07 (Lady M. Boscawen x King Alfred) x Macebearer—a good Incomparabilis.
 239/14=Fleetwing x Morven—Giant Leedsii.
 45/14=Lemon Star x White Emperor—good Giant Leedsii.
 392/14=Snowshoe x Red-crowned Seedling.

Of Poets I find Hildegard one of the best to use as a parent either way. Mrs. Ernst Krelage is giving good seedlings of fine form.

Pilgrim is a useful flower to work with; it gives very large seedlings.

Laughing Water is a very good seed parent—its children are very refined and smooth.

Seedlings from Will Scarlett x Poets, when used as pollen parents on to Poets, give a good percentage of good flowers with very bright eyes.

Cleopatra is a useful pollen flower.

Van Waveren's Giant is a good seed parent.

Beacon crossed with Ajax, Giant Incomparabilis, and Leedsii gives some very nice seedlings of good form and substance.

Bernardino gives good seedlings either way.

Empire is a very good parent either way.

Lemon Star and Loch Fyne are both useful.

Mrs. R. Sydenham a good pollen flower, giving very white seedlings—it is best mated with good Giant Leedsii, the effect of which is to shorten the crowns and lengthen the stems; almost all the seedlings will be Ajax.

White Emperor promises very well.

As a stud for a beginner I should recommend the following to start with (they are none of them very expensive now):—

King Alfred	Laughing Water	Lemon Star
Cleopatra	Princess Mary	Minnie Hume
Van Waveren's Giant	Pilgrim	Hildegard
Mme. de Graaff	Beacon	Matthew Arnold
Weardale	Empire	Socrates
Bernardino		

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

XXXV.—EFFECT OF GRASS ON APPLE TREES.

By A. N. RAWES and F. J. CHITTENDEN, F.L.S., V.M.H.

ALMOST universal experience bears out the results obtained at the Ridgmont Experimental Fruit Farm by the Duke of Bedford and Mr. S. U. Pickering in experiments upon the effect of growing fruit-trees in grass, yet even now new plantations are not infrequently allowed to become covered with grass up to the trees with bad effect upon the latter and disappointment and loss to the grower.

Row 1	Row 2	Row 3	Row 4	Row 5	Variety and Stock.
E	E*	E*	E**	E**	Emperor Alexander on Paradise.
D	D*	D*	D**	D**	Beauty of Bath on Crab.
C	C*	C*	C**	C**	Newton Wonder on Crab.
B	B*	B*	B**	B**	Manks Codlin on Crab.
A	A*	A*	A**	A**	Ribston Pippin on Paradise.

FIG. 14. SHOWING ARRANGEMENT OF TREES IN DEMONSTRATION PLOT. 1st row in cultivated ground; 2nd and 3rd rows* with grass to 1 foot 6 inches of stem; 4th and 5th rows** grassed up to stem.

It is true that in some circumstances which are not yet understood the trees do not appear to suffer to any appreciable extent, and it is possible that in other circumstances after years of struggle they may (unless they have died before—and it takes years of struggle to kill a tree) recover and eventually form fairly good trees; but while this struggle is going on the loss of crop is great and not to be compensated for by any gain from the presence of grass about the trees, arising either from grazing value or from doing away with the necessity of using the hoe frequently.

The records given here are taken from a plot planted for demonstration purposes at Wisley. They add nothing to what is already known and establish no new principle, but we make no apology for publishing them if they serve to drive home the lesson taught by the Ridgmont experiments, and deter some of those who, among the many likely to plant fruit-trees in the near future, designed to plant them in grass, or persuade others who have unthrifty young trees in grass to remove it and keep the ground cultivated for a few years.

The ground in which the trees were planted was prepared in 1911. It was poor pasture, chalked, ploughed, and manured with farmyard

manure at the rate of 20 tons to the acre and with sulphate of ammonia and superphosphate, after which a crop of early potatoes was taken. In August mustard was sown and ploughed in in November. The trees were planted ten feet apart each way in January 1912 in open weather. They were as nearly as possible of a size at planting time and were of the same age. There were five varieties and five trees of each variety. After planting, turf was laid up to the stems of two trees of each variety and so as to leave a circle of three feet of bare soil about the stems of two others, the fifth tree in each case being cultivated all round. Figure 14 on page 116 shows the arrangement of the plot.

The soil about the trees in the 1st row has been continuously cultivated; the soil in the space about the trees in rows 2 and 3 has been kept bare of grass and stirred at intervals. The grass has been cut two or three times a year but not removed, so the soil has lost nothing from the presence of the grass (except water and oxygen taken by the grass roots).

The tables on pages 118 and 119 show the amount of growth made by the trees in each year since planting; the first showing the total length of the new shoots made each year, the second the diameter of the stem at nine inches from the ground in each year (except 1917).

It will be seen that the growth of the trees with the space about them has been consistently greater than that of the trees with grass up to their stems* (indeed, in some cases the latter are smaller than when they were planted—they have never made up the length of stems removed when they were first pruned, and in one case the tree is dead), and this has been exceeded in a marked measure by the trees in cultivated ground, in every case in every year. The crops borne tell the same tale, as the following table shows:

TOTAL NUMBER OF FRUITS PRODUCED BY EACH TREE 1912-1919.

	In Grass.		In 3 feet clear space.		In cultivated land.
	1	2	1	2	1
Ribston Pippin . . .	0	0	0	27	192
Manks Codlin . . .	0	5	6	8	297
Newton Wonder . . .	0	0	0	0	77
Beauty of Bath . . .	0	0	14	5	21
Emperor Alexander . .	2	16	66	28	224

As usual, there is a marked contrast between the colour of the foliage of the trees in the cultivated ground and those with grass about them, the latter being much more yellow in tinge; the few fruits produced on the latter trees have been on the whole smaller than the many on the former.

* One tree of Manks Codlin in grass is an exception to this, for it has exceeded in some cases since 1914 the growth of either of the trees with the cultivated space around them.

TOTAL ANNUAL GROWTH OF TREES IN GRASS.

	In Grass.		In 3 feet clear space.		In cultivated land.
	Tree 1	Tree 2	Tree 1	Tree 2	Tree 1
<i>Ribston Pippin on Paradise Stock.</i>					
Growth made in 1912	10"	27"	30"	80"	292"
do. 1913	12.5"	17"	15"	84"	556"
do. 1914	11"	21"	15"	154"	757"
do. 1915	2"	5"	14"	83"	1200"
do. 1916	5"	21"	20.5"	184"	1566"
do. 1917	7"	53"	20"	498"	960"
do. 1918	none	none	4"	286"	1225"
<i>Manx Codlin on Crab Stock.</i>					
Growth made in 1912	15"	10"	15"	42"	42"
do. 1913	20.5"	14"	41"	42"	252"
do. 1914	20"	90"	72"	102"	413"
do. 1915	10"	93"	27"	54"	468"
do. 1916	9"	115.5"	80.5"	190"	1431"
do. 1917	12"	336"	192"	288"	888"
do. 1918	(tree nearly dead)	174"	120"	136"	1074"
<i>Newton Wonder on Crab Stock.</i>					
Growth made in 1912	33"	73"	141"	109"	244"
do. 1913	16.5"	17"	105"	136"	600"
do. 1914	24"	105"	366"	254"	1146"
do. 1915	17"	150"	492"	408"	1866"
do. 1916	78"	297"	528"	496"	1652"
do. 1917	42"	586"	1056"	1332"	1794"
do. 1918	276"	300"	564"	606"	1896"
<i>Beauty of Bath on Crab Stock.</i>					
Growth made in 1912	9"	16"	58"	35"	146"
do. 1913	41.5"	25"	90"	60"	336"
do. 1914	6"	18"	120"	90"	336"
do. 1915	7"	24"	105"	126"	768"
do. 1916	10.5"	15"	165"	118"	845"
do. 1917	32"	101"	134"	492"	748"
do. 1918	57"	82"	63"	315"	720"
<i>Emperor Alexander on Paradise Stock.</i>					
Growth made in 1912	12"	28"	113"	44"	80"
do. 1913	12"	27"	142"	51"	138"
do. 1914	19"	48"	90"	66"	222"
do. 1915	6"	50"	120"	47"	414"
do. 1916	24"	93"	175.5"	131"	1135"
do. 1917	12"	212"	288"	132"	558"
do. 1918	79"	180"	258"	135"	1404"

DIAMETER OF STEMS NINE INCHES ABOVE SOIL LEVEL IN EACH YEAR SINCE PLANTING.

		In grass.		In 3 feet clear space.		In cultivated land.
		Tree 1	Tree 2	Tree 1	Tree 2	I
<i>Ribston Pippin on Paradise Stock.</i>						
At planting	1912	0.425	0.3	0.475	0.425	0.55
Winter	1912	0.425	0.34	0.44	0.45	0.55
do.	1913	0.43	0.395	0.49	0.57	0.97
do.	1914	0.46	0.44	0.49	0.66	1.5
do.	1915	0.45	0.42	0.49	0.66	1.74
do.	1916	0.45	0.44	0.56	0.74	2.4
do.	1917	?	?	?	?	?
do.	1918	0.5	0.62	0.7	1.3	3.5
<i>Manx Codlin on Crab Stock.</i>						
At planting	1912	0.425	0.625	0.375	0.55	0.55
Winter	1912	0.49	0.7	0.42	0.59	0.6
do.	1913	0.46	0.73	0.44	0.6	0.87
do.	1914	0.49	0.78	0.56	0.71	1.2
do.	1915	0.5	0.785	0.565	0.84	1.6
do.	1916	0.5	0.91	0.61	0.99	1.83
do.	1917	?	?	?	?	?
do.	1918	0.6	1.7	1.1	1.5	2.5
<i>Newton Wonder on Crab Stock.</i>						
At planting	1912	0.625	0.8	0.85	0.75	0.95
Winter	1912	0.625	0.92	0.87	0.62	1.07
do.	1913	0.64	0.88	0.93	0.88	1.4
do.	1914	0.66	1.01	1.37	1.19	1.99
do.	1915	0.74	1.14	1.38	1.56	2.62
do.	1916	0.83	1.48	1.68	1.86	4.0
do.	1917	?	?	?	?	?
do.	1918	1.1	2.0	2.8	3.1	4.25
<i>Beauty of Bath on Crab Stock.</i>						
At planting	1912	0.775	0.6	0.7	0.575	0.825
Winter	1912	0.75	0.63	0.69	0.56	0.85
do.	1913	0.76	0.68	0.73	0.68	1.2
do.	1914	0.85	0.68	0.92	0.89	1.53
do.	1915	0.86	0.71	0.99	1.01	1.78
do.	1916	0.86	0.72	1.19	1.18	2.16
do.	1917	?	?	?	?	?
do.	1918	0.9	0.81	1.6	1.8	3.02
<i>Emperor Alexander on Paradise Stock.</i>						
At planting	1912	0.525	0.575	0.725	0.475	0.675
Winter	1912	0.57	0.57	0.75	0.47	0.67
do.	1913	0.57	0.55	0.83	0.56	0.88
do.	1914	0.57	0.68	0.9	0.65	1.3
do.	1915	0.57	0.68	0.99	0.66	1.4
do.	1916	0.57	0.72	1.20	0.70	2.20
do.	1917	?	?	?	?	?
do.	1918	0.7	1.2	1.52	1.25	2.625

ORIENTAL POPPIES AT WISLEY, 1917.

THREE plants of each of eighty stocks of Oriental Poppies were received for trial at Wisley in the autumn of 1915, and were grown on for judging when thoroughly established in 1917. Most of them grew well and flowered satisfactorily: where the contrary occurred note is made in the descriptions. The form known as *Papaver bracteatum* is often distinguished in gardens from *P. orientale* by its greater height and by the presence of a bract immediately below the flower; but since the garden value of the plants is much the same whether the bracts are present or not, and since also bracts are sometimes present in a variety and sometimes absent, no attempt has been made to give the bracts a classificatory value in the following notes. It will be seen, however, that some varieties are much dwarfer than others, and that there is a marked difference in the size of the flowers in different varieties. The Floral Committee examined the plants on June 8, 1917, when all were in flower and made the following recommendations for awards:

Highly Commended (XXX).

- No. 17. Bobs, sent by Mr. Notcutt.
- 20. Felix, sent by Mr. Notcutt.
- 48. Orange Globe, sent by Messrs. R. Veitch.
- 52. Royal Scarlet, sent by Messrs. Barr.
- 35. Cerise Beauty, sent by Messrs. Barr.
- 33. V. L. Harkness, sent by Messrs. Harkness.
- 67. Boadicea, sent by Messrs. Barr.
- 59. Hesperia, sent by Messrs. Bunyard.

Commended (XX).

- 7. Fürstenkind, sent by Messrs. Bunyard.
- 44. Silberblick, sent by Mr. Notcutt.

Of these none had previously received an award, but the following represented in the trial had received Awards in years past, although now passed over: No. 6, Blush Queen (**F.C.C.** 1888, Ware); Nos. 13, 15, Jennie Mawson (**A.M.** 1907, Mawson); No. 21, Lady Roscoe (**A.M.** 1903, Notcutt); Nos. 22, 23, Princess Ena (**A.M.** 1907, Perry); Nos. 24, 25, Queen Alexandra (**A.M.** 1906, Perry); Nos. 26, 27, Mrs. Perry (**A.M.** 1906, Perry); Nos. 46, 47, Mrs. Marsh (**A.M.** 1901, Perry).

VARIETIES.*

- | | |
|----------------------------|-----------------------|
| 1. Muriel Russell. | 2. Black & White. |
| 1A. C. J. van Bourgondieu. | 2A. Silvery Moon. |
| 1B. Madge Knowles. | 3. Elsie G. Harkness. |

* Varieties grown for trial in the Wisley Gardens are known by number only until the judging is completed.

4. Blush Queen or Marguerite.	41. }	R. C. Notcutt.
5. Psyche.	42. }	
6. Blush Queen.	43. Star of Devon.	
7. Fürstenkind.	44. Silberblick.	
8. Princess of Wales.	45. Dod's Hybrid.	
9. Freak.	46. }	Mrs. Marsh.
10. Mrs. Peacock.	47. }	
11. Marie Studholme.	48. Orange Globe.	
12. }	49. Australia.	
13. }	50. Grenadier.	
14. Jennie Mawson.	51. Rembrandt.	
15. }	52. Royal Scarlet.	
16. Princess Victoria Louise.	53. }	Grenadier.
17. Bobs.	54. }	
18. Mrs. John Harkness.	55. Glendica.	
19. Magnate.	56. Taplow Scarlet.	
20. Felix.	57. Goliath.	
21. Lady Roscoe.	58. Magnificent.	
22. }	59. Hesperia.	
23. Princess Ena.	60. Duke of Teck.	
24. }	61. Waterloo.	
25. Queen Alexandra.	62. }	Oriental King.
26. }	63. }	
27. Mrs. Perry.	64. Crimson King.	
28. Barbara.	65. Livermere.	
29. Rose Queen.	66. Beauty of Livermere.	
30. }	66A. Monarch.	
31. Mrs. Perry.	67. Boadicea.	
32. Mrs. J. Harkness.	68. Phyllis.	
33. V. L. Harkness.	69. Sandringham.	
34. La Reine des Cerises.	70. Winnie.	
35. Cerise Beauty.	71. Aunt Chloë.	
36. Joyce.	72. Harmony.	
37. Leviathan.	73. Marquis.	
38. }	74. Madge.	
39. Autocrat.	75. Mahony.	
40. Doris.	76. Devonian.	

DESCRIPTIONS.

Creamy White.

2. Black and White (Harkness).—Height 2 feet 8 inches; flower 6 inches; white with large black purple blotch; flowering from May 29.

2A. Silvery Moon (Harkness).—Height 2 feet 8 inches; flower 5 to 6 inches, white, black purple blotch, red at base; flowering from May 29. Similar to No. 2 but blotch smaller.

1A. C. J. van Bourgondieu (Harkness).—Height 3 feet; flower 6 inches, white, purple blotch; flowering from June 4.

1B. Madge Knowles (Harkness).—Height 2 feet 3 inches; flower 6 inches, white, purple blotch. Similar to 1A.

1. Muriel Russell (Harkness).—Height 2 feet 6 inches; flower 4 inches, white, black purple blotch; flowering June 1.

White with Pink Flush.

3. Elsie G. Harkness (Harkness). XXX June 8, 1917.—Height 2 feet 9 inches; flower 5 inches, very pale pink with purple blotch, reddish at base; flowering from May 29.

Mauve White.

4. Blush Queen or Marguerite (Bunyard).—Height 2 feet 8 inches; flower 4½ inches, mauvy white, faint purple streak in centre; flowering from May 29. Paler than No. 6 and almost without spot.

Pale Blush Pink.

6. Blush Queen (Notcutt).—Height 3 feet 6 inches; flower 5 inches, pale blush pink, dark purple streaked blotch; flowering from May 16.

5. Psyche (Notcutt).—Height 3 feet 6 inches; flower 5 inches, pale blush pink, small dark purple streaked blotch, a little darker than No. 6; flowering from May 16.

19. Magnate (Wallace).—Height 3 feet; flower $4\frac{1}{2}$ inches, dull papery pink, faintly streaked darker, black purple streaked blotch; flowering from June 5. Only one plant flowered.

Pinkish Mauve.

8. Princess of Wales (Barr).—Height 2 feet 10 inches; flower 5 to 6 inches, mauve pink, black purple blotch, streaked reddish purple base; flowering from May 29.

29, 30. Rose Queen (Notcutt, Wallace), No. 30 XXX June 8, 1917.—Height 3 feet 8 inches; flower 6 inches, pinkish mauve with streaked purple blotch; flowering from June 4.

Deep Pink.

7. Fürstenkind (Bunyard).—Height 3 feet 9 inches; flower 6 inches, deep pink with large dark purple blotch; flowering from June 6.

Salmon Pink.

17. Bobs (Notcutt), XXX June 8, 1917.—Height 3 feet; flower $4\frac{1}{2}$ inches, no bracts, flesh pink, dark purple streaked blotch; flowering from June 6.

20. Felix (Notcutt), XXX June 8, 1917.—Height 2 feet 8 inches; flower 4 to $4\frac{1}{2}$ inches, pink, deeper than No. 26, black purple blotch; flowering from May 29.

9. Freak (Harkness).—Height 3 feet 6 inches; flower 7 inches, petals deeply cut, deep salmon pink, large black purple blotch; flowering from June 8.

13, 14, 15. Jennie Mawson (Simpson, Wallace, Barr).—Height 2 feet 4 inches; flower 6 inches, light flesh pink, streaked black purple blotch; flowering from June 4. No. 14 failed, and Nos. 13 and 15 did badly and were consequently dwarf.

21. Lady Roscoe (Notcutt).—Height 2 feet 8 inches; flower $4\frac{1}{2}$ to 5 inches; bracts none, bright salmon pink; flowering from May 29.

11, 12. Marie Studholme (Simpson, Wallace).—Height 2 feet 9 inches to 3 feet; flower 5 inches, salmon, small purple spot; flowering from June 1.

18, 32. Mrs. John Harkness (Harkness, Simpson), No. 32 XXX June 8, 1917.—Height 3 feet to 3 feet 8 inches; flower $4\frac{1}{2}$ to 6 inches, petals slightly notched, deep salmon pink, black purple blotch; flowering from May 29. In No. 18 the petals were finely or coarsely notched and the flower was paler.

10. Mrs. Peacock (Harkness).—Height 3 feet; flower $4\frac{1}{2}$ inches, bracts none, deep salmon pink, large black purple blotch; flowering from May 30.

26, 27, 31. Mrs. Perry (Barr, Notcutt, Simpson), No. 26 XXX June 8, 1917.—Height 3 feet 6 inches; flower 4 to 6 inches, deep flesh pink with small black purple blotch; flowering from May 29.

22, 23. Princess Ena (Notcutt, Wallace).—Height 3 feet 6 inches; some petals slightly notched; flower 4 inches, salmon pink, some with faint purplish streak; flowering from May 29.

16. Princess Victoria Louise (Wallace).—Height 3 feet; flower $3\frac{1}{2}$ to 4 inches, light flesh pink, black purple streaked blotch; flowering from May 30.

24, 25. Queen Alexandra (Barr, Notcutt).—Height 3 feet 6 inches; flower 4 to 5 inches, pink, deeper than No. 26, small black purple streaked blotch; flowering from May 29. No. 25 had one plant rather deeper in colour.

41, 42. R. C. Notcutt (Barr, Notcutt).—Height 3 feet 3 inches to 3 feet 9 inches; flower 5 inches, salmon pink with purple black streaked blotch; flowering from June 10.

43. Star of Devon (Godfrey).—Height 4 feet; flower $5\frac{1}{2}$ inches, deep salmon, dark purple blotch; flowering from June 4.

Orange Red.

49. Australia (Barr).—Height 3 feet 8 inches; flower 5 to $5\frac{1}{2}$ inches, bracts none, bright vermillion, black purple streaked blotch; flowering from June 1.

50, 53, 54. Grenadier (Godfrey, Bunyard, Barr).—Height 3 feet 8 inches to 4 feet; flower 5 to 6 inches, brilliant orange scarlet, black streaked blotch;

petals shining; flowering from June 1. No. 50 was lighter in colour with petals of a paper texture, and No. 53 had no bracts and came into flower a week earlier.

48. Orange Globe (R. Veitch), XXX June 8, 1917.—Height 3 feet 4 inches; bracts small; flower 4 to 5 inches, orange red, purple blotch; flowering from May 22.

52. Royal Scarlet (Barr), XXX June 8, 1917.—Height 3 feet to 4 feet; bracts none; flower 6 inches, deep orange, black purple blotch; flowering from June 4.

Cerise.

35. Cerise Beauty (Barr), XXX June 8, 1917.—Height 3 feet 6 inches; flower 5 inches, light scarlet lake deeper at base, black purple streaked blotch; flowering from June 6.

36. Joyce (Barr).—Height 3 feet 8 inches; flower 4½ inches, scarlet lake, black purple blotch; flowering from May 29.

34. La Reine des Cerises (Bartlett).—Height 3 feet 9 inches; flower 5 inches, scarlet lake, small black purple streaked blotch; flowering from June 6. Only one plant.

33. V. L. Harkness (Harkness), XXX June 8, 1917.—Height 4 feet; flower 7 to 8 inches, brilliant scarlet lake, with black streaked blotch; flowering from June 8.

44. Silberblick (Notcutt), XX June 8, 1917.—Height 3 feet 8 inches; flower 5 inches, petals four, silvery scarlet with silvery spot at base, white filaments; flowering from May 22.

Scarlet.

45. Dod's Hybrid (Wallace).—Height 2 feet 9 inches; flower 3½ to 4 inches, without bracts, petals four, buff scarlet; flowering from June 1. One plant with slender peduncles, flower thin in texture, stamens bluish.

51. Rembrandt (Bunyard).—Height 4 feet; bracts none; flower 6 inches; bright vermillion, black purple blotch; flowering from June 5.

55. Glendica (Bunyard).—Height 3 feet 9 inches; bracts none; flower 5 to 6 inches, bright scarlet with black blotch, blue spots fading to white; flowering from May 22.

56. Taplow Scarlet (Barr), XXX June 8, 1917.—Height 3 feet 8 inches; flower 7 inches, scarlet, black purple blotch; flowering from May 29.

57. Goliath (Barr).—Height 4 feet; flower 7 inches, scarlet, black blotch forming blunt-pointed star; flowering from May 29. Almost identical with No. 56.

58. Magnificent (Barr).—Height 3 feet 6 inches; flower 6 inches, scarlet, with very large black purple blotch; flowering from June 4.

46, 47. Mrs. Marsh (Wallace, Notcutt).—Height 3 feet to 3 feet 8 inches; flower 4 to 7 inches, bracts none, scarlet, black purple blotch; flowering from May 29. No white flakes, which are said to be typical of this, are present in the flowers.

61. Waterloo (Wallace).—Height 4 feet; bracts none; flower 5 inches, scarlet, with black purple streaked blotch; flowering from June 1.

60. Duke of Teck (Barr).—Height 4 feet; flower 4 inches, scarlet, black purple blotch; flowering from June 5.

62, 63. Oriental King (Harkness, Simpson).—Height 2 feet 8 inches to 3 feet; bracts none; flower 5½ to 6 inches, scarlet, black purple streaked blotch; flowering from June 4. Buds very round. Lighter than No. 64.

Crimson Scarlet.

65, 66. Beauty of Livermere (Simpson, Wallace), XXX June 8, 1917.—Height 4 feet 6 inches; flower 7 inches, deep scarlet, black streaked blotch, petals wavy; flowering from June 1.

67. Boadicea (Barr), XXX June 8, 1917.—Height 4 feet 6 inches; flower 6 inches, scarlet, black blotch forming blunt-pointed star; flowering from May 30. Not quite so deep as No. 66.

64. Crimson King (Barr).—Height 3 feet 8 inches; flower 5 inches, brilliant scarlet, black blotch, streaked outside; flowering from May 25. Mixed, one lighter in colour and with smaller flowers. Slightly paler than No. 67.

59. Hesperia (Bunyard), XXX June 8, 1917.—Height 4 feet; flower 6 inches, petals wavy, scarlet, small black streaked blotch; flowering from May 29.

Rosy Mauve.

38, 39. Autocrat (Godfrey, Wallace).—Height 3 feet 6 inches to 3 feet 9 inches; flower 5 to 6 inches, very deep rosy mauve, large black streaked blotch; flowering from May 29.

37. Leviathan (Godfrey).—Height 3 feet 6 inches; flower 6 inches, rosy mauve, small black purple streaked blotch; flowering from May 29;

Rosy Claret.

69. Sandringham (Godfrey).—Height 3 feet; flower 6 inches, rosy claret, lighter margin, black purple streaked blotch; flowering from May 30.

71. Aunt Chloe (Wallace).—Height 3 feet; flower 6 inches, wine colour, black purple streaked blotch; flowering from June 1. Rather larger flower than No. 69.

72. Harmony (Wallace).—Height 3 feet 6 inches; flower 5 inches, purplish, black purple blotch; flowering from May 29.

70. Winnie (Wallace).—Height 3 to 4 feet; flower 5 inches, rosy claret, black purple streaked blotch; flowering from June 1. Rather darker than No. 69.

68. Phyllis (Godfrey).—Height 4 feet 6 inches; flower 5 to 5½ inches, crimson lake, black purple blotch; flowering from June 4. Still darker than No. 69.

Purplish Old Rose.

73. Marquis (Wallace).—Height 2 feet 9 inches; flower 4 inches, purplish old rose, black purple blotch; flowering from June 10.

74. Madge (Godfrey).—Height 3 feet; flower 5 inches; purplish old rose, black purple streaked blotch; flowering from June 1. Mixed, one plant of 'Winnie.'

40. Doris (Wallace).—Identical with No. 74.

Carmine.

66A. Monarch (Godfrey).—Height 4 feet; flower 5½ inches; carmine with small black blotch; flowering from June 2.

Dark Maroon.

76. Devonian (R. Veitch).—Height 3 feet 9 inches; flower 5½ inches; dark maroon with large black blotch; flowering from May 29.

75X. Mahony (Simpson).—Height 4 feet; flower 4½ inches, dark maroon, almost without blotch; flowering from June 1. Mixed, one plant of 'Queen Alexandra.'

BRUSSELS SPROUTS AT WISLEY, 1918.

THE seed of the Brussels Sprouts was sown (except that of Nos. 63 and 64) in gentle heat on February 25, 1918; the plants were pricked out into cold frames on March 15, and after hardening off were planted out in their permanent quarters on May 13. The ground had been occupied in 1917 by late peas, and after clearing was manured with stable manure, and dug during the winter, being left rough on the surface until April when it was forked over. So treated practically all varieties produced firm sprouts, whether of large or small size, making the selection of the best no easy task. Of the sixty-four stocks sent for trial one or two noted below were mixed, and a few contained bolters, but most produced good crops of excellent sprouts.

Nos. 63 and 64 were sent in as plants, having been raised in autumn and wintered before we received them. There was no great difference between these and the corresponding plants raised at Wisley as above from the same stock seed.

The Fruit and Vegetable Committee examined the trial on November 15, 1918, and made the following recommendations:—

Award of Merit.

- 12. Dundee, introduced and sent by Messrs. Barr.
- 61. Favourite, introduced and sent by Messrs. Artingstall.

Highly Commended.

- 10. Dalkeith, sent by Messrs. Scarlett.
- 26. Holborn Exhibition, raised and sent by Messrs. Carter.
- 40. Rosny, sent by Messrs. Barr.

Commended.

- 2. Aigburth Giant, sent by Messrs. R. Veitch.
- 29. King of the Market, sent by Messrs. Barr.
- 38. Perfection, raised and sent by Messrs. E. W. King.
- 64. Darlington, raised by Messrs. Kent and Brydon, sent by Messrs. Scarlett.

No variety of Brussels Sprouts under either of the above names has hitherto received an award, but "Certificates of Merit" were given to 'Paris Market' among the small varieties, and to 'Large Wroxtton' among the large when exhibited at the Vegetable Conference at Chiswick in September 1889; both were represented in the present trials.

DESCRIPTIONS AND NOTES.

TALL VARIETIES (over 24 inches).

- 2*. AIGBURTH GIANT (R. Veitch), XXX Nov. 15, 1918.—24 to 28 inches; sprouts of medium to large size. Early.
1. AIGBURTH (Carter).—Like No. 2, but dwarfier, showing some variation in colour, sprouts smaller. Crop rather less.
- 3, 60. CAMBRIDGESHIRE CHAMPION (Barr, Gray) } —24 to 30 inches; foliage large, spreading; sprouts large. Early.
4. CLARKE'S SELECTED (Barr) }
5. CLIMAX (Yates).—18 to 32 inches; foliage medium; sprouts medium to large. Later. Stands well. Variable in height.
- 6, 7, 8. COVENT GARDEN (Hurst, Sydenham, Barr).—24 to 36 inches; foliage large; sprouts large. Stocks uneven.
10. DALKEITH (Scarlett), XXX Nov. 15, 1918.—24 to 32 inches; foliage very large; sprouts large. Much grown in Midlothian. Early.
- * 9, 63. DALKEITH (Barr, Scarlett).—Like 10. No. 63 received as plants but gave much smaller crop.
64. DARLINGTON (Scarlett), XX Nov. 15, 1918.—24 to 30 inches; foliage large to very large; sprouts large. Later. Received as plants.
- 11, 51. DARLINGTON (Scarlett, Barr).—Similar to 64.
12. DUNDEE (Barr), A.M. Nov. 15, 1918.—24 to 30 inches; foliage medium to large; sprouts medium to large.
20. EXHIBITION (Dickson and Robinson).—18 to 30 inches; foliage medium to large; light green; sprouts small to medium. Later. Stood well. Irregular as to height.
- 21, 22. EXHIBITION (Barr, R. Veitch).—18 to 30 inches; foliage of medium size; sprouts medium. Uneven in height.
38. PERFECTION (E. W. King), XX Nov. 15, 1918.—24 to 36 inches; foliage large; sprouts large. Later. A heavy cropper.
37. PERFECTION (Carter).—Similar to No. 38 but less leafy and vigorous, and giving a much smaller crop.
39. PRESIDENT CARNOT (Barr).—24 to 30 inches; foliage large, medium green; sprouts large.
40. ROSNY (Barr), XXX Nov. 15, 1918.—24 to 30 inches; leaves small to medium, very dark green; sprouts large. Later. Very distinct in colour.
49. TALL FRENCH (Barr) } —24 to 36 inches; leaves large to very large; sprouts large. Rather late. Standing well.
50. THE BULLET (Barr) }
- 52, 53, 54, 55. WROXTON (Sydenham, Watkins and Simpson, R. Veitch, Barr).—24 to 27 inches; foliage of medium size; sprouts large. No. 53 was a more regular stock than others. Nos. 52, 54, 55 varied much in height, and Nos. 54 and 55 in other ways as well.
57. EVESHAM SPECIAL (Watkin and Simpson).—24 to 36 inches; foliage very large; sprouts large. Plants variable in cropping.
58. PYRAMID (Gray).—Slightly dwarfier than 57, with rather smaller leaves. Early. Crop small.
59. BEDFORDSHIRE GIANT (Gray).—24 to 30 inches; foliage very large; sprouts large. Early.
61. FAVOURITE (Artingstall), A.M. Nov. 15, 1918.—24 to 30 inches; foliage large but not very spreading, dark green; sprouts medium to large. Early. A very regular stock.
62. SELECTED (Dobbie).—24 to 36 inches; foliage and sprouts large. Early.
42. SCRYMGER'S GIANT (Barr).—20 to 30 inches; foliage very large, medium to dark green; sprouts medium to large. Medium late.
43. SKIRBECK FAVOURITE (Barr).—A very mixed stock.

DWARFER VARIETIES (up to 2 feet).

13. DELICATESSE (Barr).—18 to 24 inches; foliage medium to very large, dark green; sprouts large.
14. DWARF EXFURT (Barr).—18 to 20 inches; foliage medium size, dark green; sprouts of medium size.

* See footnote, p. 120.

15. DWARF GEM (Sutton).—16 to 24 inches; foliage rather more spreading than No. 14; sprouts small to medium. Early.
16. DWARF GEM (Sydenham).—Similar to No. 15.
17. IMPROVED DWARF (Carter).—Stock somewhat mixed, otherwise like Nos. 15 and 16.
- 18, 19. EXHIBITION (Barr, Sutton).—18 to 24 inches; foliage of medium size, lighter green; sprouts small to medium. Fairly early. No. 19 (Messrs. Sutton's) was the truer stock.
23. FAVOURITE (Sydenham).—15 to 20 inches; foliage of medium size, light green; sprouts small to medium.
24. HOWCROFT'S GIANT (Barr).—16 to 24 inches; foliage of medium size, light green; sprouts small to medium. Later. Producing a heavy crop.
25. HERCULES (Hancock).—15 to 20 inches; foliage of medium size; sprouts small to medium. Later. A rather variable stock. Raised by sender, 1915. 'Sharpe's Standard' (No. 48) × 'Dwarf Gem' (No. 15).
26. HOLBORN EXHIBITION (Carter), XXX Nov. 5, 1918.—18 to 24 inches; foliage of medium size, light green; sprouts small to medium. Later. Producing a very heavy crop. A good regular stock.
- 27, 28. IDEAL (Barr, Dickson, Brown & Tait).—15 to 18 inches; foliage of medium size; sprouts small to medium. Later. Raised by Mr. Taylor of Byram Park Gardens, introduced by Messrs. Dickson, Brown & Tait.
29. KING OF THE MARKET (Barr), XX Nov. 15, 1918.—18 to 24 inches; leaves medium to large, light green; sprouts small to medium. Early. A heavy cropper.
30. KING OF THE MARKET (R. Veitch).—A less regular stock of No. 29, taller and later.
31. LITTLE GEM (Barr).—18 to 24 inches; foliage and sprouts medium size. Later.
32. MARKET FAVOURITE (Sutton).—18 to 24 inches; foliage and sprouts of medium to large size. Early. A good cropper.
- 33, 34. MATCHLESS (Barr, Sutton).—18 to 24 inches; leaves and sprouts of medium to large size. Early. Raised by Messrs. Sutton.
35. SELECT OFFENHAM (Yates).—24 to 30 inches; foliage medium to large; sprouts large. Early.
36. PARIS MARKET (Barr).—18 to 24 inches; foliage medium to large; sprouts medium to large. A heavy cropper, but stock mixed.
- 44, 45, 46. SOLIDITY (Barr, Alexander & Brown, Holmes).—20 to 24 inches; leaves medium to large, light green; sprouts medium to large. Early. Raised by Mr. Harper of Tullibardine Gardens.
47. STANDARD (Barr).—18 to 24 inches; leaves of medium size, very dark green; sprouts small to medium. Late.
48. STANDARD (SHARPE'S) (Barr).—A mixed stock.
56. EVESHAM SPECIAL (Barr).—18 to 24 inches; leaves medium to large; sprouts large.
41. ST. FORT (Staward).—18 to 24 inches; foliage very large, medium to dark green; sprouts medium to large; Late. Raised by sender between 'Dalkeith' (No. 10) and 'Dwarf Gem' (No. 15).

CARROTS AT WISLEY, 1918.

SIXTY-ONE stocks of carrot were sent for trial in 1918. They were sown on ground occupied by onions in the previous year, followed by a crop of mustard dug in in autumn. The first sowing of all the stocks was made on April 24, and the crop was thinned to 4 inches or 6 inches, according to the variety on June 11. The plants looked very promising until June 20, when carrot fly attack made itself very evident, especially on the short-rooted varieties. A second sowing was accordingly made on June 25, thinning being done on July 23. This sowing escaped the fly entirely. The germination of Nos. 27, 28, 50, and 57 was poor, and of Nos. 17, 45, 46, 47, 49, and 52 only fair, the remainder germinated well. The crops were examined by the Fruit and Vegetable Committee in August and November, and the following awards were made :

Highly Commended.

No. 4. Early Frame, sent by Messrs. Barr, introduced by Messrs. Watkins & Simpson.

12. Early Queen, sent by Messrs. Barr, said to be of French origin.

52. New Intermediate, sent by the introducers, Messrs. R. Veitch.*

Commended.

16. Champion Horn, sent by introducers, Messrs. Sutton.

54. Improved Long Red Surrey, sent by introducers, Messrs. Sutton.

44. New Scarlet Intermediate, sent by Messrs. Sydenham.

49. Perfection, sent by introducers, Messrs. Dickson & Robinson.

Special attention may be directed to the forms mentioned below with small tops since they take such small space in the garden.

DESCRIPTIONS AND NOTES.

I. ROOTS YELLOW.

60. LONG YELLOW STUMP-ROOTED (Barr) }
61. LONG LEMON (Barr) } —These were both taper-rooted varieties about 7 to 10 inches long and 2 to 2½ inches diameter, with a small yellow core. Foliage large.

II. ROOTS RED.

A. ROOTS ALMOST ROUND, 2 TO 2½ INCHES LONG AND WIDE.

1. *Foliage small and sparse.*

1. INIMITABLE FORCING (Sutton).—Stock contained some bolters.

2. EARLIEST FRENCH SHORT HORN (Barr).

3. FRENCH FORCING HORN (R. Veitch).

4. EARLY FRAME (Barr).—H.C., Aug. 22, 1918.

* This variety received A.M. in 1903 when sent by Messrs. R. Veitch.

2. *Foliage larger.*

5. LITTLE GEM (Dickson & Robinson).—Roots not quite uniform.
 6. PARISIAN FORCING (Barr).—Contained some of "Intermediate" type.
 7. EARLY GEM (Sutton).—Roots not quite uniform.

B. ROOTS SLIGHTLY LONGER THAN WIDE, 3 TO 4½ INCHES LONG,
2 TO 2½ INCHES WIDE.1. *Foliage small, sparse.*

12. EARLY QUEEN (Barr).—H.C., Nov. 15, 1918.

2. *Foliage medium.*

8. BELLOT SHORT RED FORCING (Barr).—Roots not uniform in shape.
 9. EARLY RED DUTCH (Barr).—Roots not uniform. Some of "Intermediate" type, and yellow.
 10. DUTCH HORN (Barr).—Contained some "Intermediate" yellow roots.
 13. EARLY SHORT HORN (Barr).
 14. EARLY HORN (Sutton).—Contained one bolter.

3. *Foliage large.*

11. EARLY GUERANDE (Barr).—Stock mixed.
 23. HALF-LONG SCARLET METZ (Barr).—Mixed, contained some long yellow.
 36. MATCHLESS (Dickson & Robinson).—Roots not uniform, some short, some half-long.
 58. SCARLET PERFECTION (Dobbie).—A little larger than others. No core.

C. ROOTS TOP-SHAPED, 4 TO 6 INCHES LONG, 2½ TO 3 INCHES WIDE.

1. *Foliage large.*

22. SUMMER FAVOURITE (Carter).

C. ROOTS CYLINDRICAL (STUMP), 4 TO 6 INCHES.

1. *Foliage small and sparse.*

16. CHAMPION HORN (Sutton).—C., Nov. 15, 1918. Core small.

2. *Foliage of medium size.*

15. IMPROVED EARLY HORN (Carter).—Roots not uniform, some shorter, as in previous class.
 20, 21. PRIMO (Watkins & Simpson, Barr).
 34. STUMP-ROOTED (Dobbie).—Thicker roots than foregoing. Foliage dwarf.
 35. STUMP-ROOTED, HALF-LONG SCARLET (Barr).—Roots as in 34. Tops rather variable.
 38. CARENTAN (Barr).

3. *Foliage large.*

17. SCARLET MODEL (R. Veitch).—Some roots forked.
 18. EARLY SCARLET, NANTES (Sydenham).
 24, 25. FAVOURITE (Sutton, Barr).—Roots somewhat variable in shape.
 26, 27. EARLY MARKET (Watkins & Simpson, Barr).
 29. HALF-LONG LUC (Barr).—One bolter. Roots not uniform, some yellow.
 30, 31. DANVERS HALF LONG (Thorburn, Barr).—Perhaps better in next section.
 33. STUMP-ROOTED SCARLET (Barr).
 37. MONUMENT (Barr).
 39. INTERMEDIATE SCARLET STUMP-ROOTED (Barr).—Foliage very strong.

D. ROOTS CYLINDRICAL (STUMP), LONGER THAN C.

1. *Foliage medium.*

50. LONG KEEPER (Barr).—6 to 10 inches, almost without core.
 51. SANS CŒUR (Barr).—7 inches, 2½ wide, without core.

2. *Foliage large.*

- 19, 28. EARLY NANTES HORN (R. Veitch, Barr).
- 32. CHANTENAY (Barr).

E. ROOTS INTERMEDIATE IN LENGTH, TAPERING.

- 40. RED INTERMEDIATE (Carter).—One bolted.
- 41. NEW RED INTERMEDIATE (Sutton).—Of a deep red colour.
- 42. INTERMEDIATE (Dobbie).
- 43. SCARLET INTERMEDIATE (Sutton).
- 44. NEW SCARLET INTERMEDIATE (Sydenham).—C., Nov. 22, 1918.
- 45, 47. JAMES' INTERMEDIATE (Watkins & Simpson, Barr).—One bolted in each stock.
- 46. JAMES' SCARLET INTERMEDIATE (R. Veitch).—Roots varied in shape, some being of "horn" type.
- 48. NEW INTERMEDIATE (Barr).—A very mixed stock.
- 52. NEW INTERMEDIATE (Veitch).—H.C., Nov. 22, 1918.

F. ROOTS LONG AND TAPERING.

- 49. PERFECTION (Dickson & Robinson).—One bolted.
- 53. LONG SURREY (Barr).—A poor stock.
- 54. IMPROVED LONG RED SURREY (Sutton).—C., Nov. 22, 1919. Brick red.
- 55, 56. ALTRINCHAM (Dobbie, R. Veitch).—Both stocks contained bolters. Deep red.
- 57. LONG BLOOD-RED (Barr).—Purplish red. Stock mixed with yellow rogues.
- 59. SCARLET PERFECTION (Carter).—Rather variable in colour. Mainly orange red.

BOOK REVIEWS.

"British Grasses and their Employment in Agriculture." By S. F. Armstrong. 8vo. viii + 199 pp. (University Press, Cambridge, 1917.) 6s. net.

Grasses are of such enormous value on the farm and in such demand where lawns are to be made and maintained, that a really good book dealing adequately with them is bound to find a place near to the hand of the farmer and the gardener. Nothing quite so good as this for their purposes has appeared in English, and whether we test it for its botanical accuracy, the value of the numerous (mostly original) drawings and photographs that illustrate it, or the information on the characteristics of growth which the farmer and gardener need to take into account, we find it full, clear, and exact. Considerable space is given up to the description of the seed, and to statistics concerning purity and capacity for germination as well as to notes upon the nature of the impurities that may be expected to occur in different samples. Altogether it is a book which should be in the hands of everyone whose interest and business it may be to deal with British grasses in any way.

"Late Cabbage." By E. N. Reed. 8vo. xiii + 131 pp. (Chapman and Hall, London, 1917.) 6s. net.

A treatise on the cultivation of such a common field crop for one particular season is somewhat of a novelty in market-gardening, but the treatment meted out to the subject amply justifies the innovation. No cultivator of cabbages can afford to neglect, if he wishes for full crops, the thorough working of the soil which the writer advocates, for upon it depends not only the constant supply of water necessary for the well-being of the plants throughout their lives, but also the equally important fact that there need then be no delay in transplanting at the proper time. Every experienced grower knows that delay at the early end of the season means failure to produce hard and heavy heads at harvest, just as every grower knows that too great space may lead to the production of heads too large for the market. The times and the seasons as well as the action are more familiar to the Americans than to the English grower, but the principles enunciated and the main lessons taught are the same for England as America.

The following is typical of the diction: "What is the best method to follow when transplanting cabbage? The time used to be when hand-setting was thought best, but that time has long gone by. Perhaps quite a portion of the growers are using two-horse machines." The author then goes on to describe these machines and their drawbacks, comparing them in cost with the "Masters' Land Planter" to the praise of the latter both for economy and efficiency; and he finally says "It seems as if there are a few facts stated here that every thinking man would grasp" (pp. 52-58).

The various pests which attack the cabbage are described and appropriate methods of dealing with them detailed.

The saving of cabbage seed is also described and the necessary precautions outlined.

"Grapes, and How to Grow Them." By J. Landsell. Ed. 3. Edited by W. Sanders. Ed. 3. 8vo. 114 pp. (Collingridge, London, 1919.) 3s. 6d. net.

Amateurs who possess only one greenhouse, and others with larger accommodation, often inquire for a practical book on Vines and their management, which is not too expensive for limited means; and in this book they will find all the information they are likely to need. The chapter dealing with Vines in Greenhouses in which other plants are growing as well is particularly valuable for the amateur; and the other chapters are excellent for all grape-growers, and well worthy of close attention.

"Vegetable Gardening." By J. S. Chisholm. 8vo. 126 pp. (Jack, London, 1919.) 1s. 3d. net.

When we say this excellent little book was written by Mr. Chisholm, the senior Lecturer in Horticulture, Edinburgh, and East of Scotland College of Agriculture, some idea may be formed of its practical and exceedingly valuable

scope. It has the great merit, too, of being of reasonable price, putting it within the reach of all. The opening chapter on soil management will be especially useful to allotment holders, and to others with more extensive gardens, showing how best to carry out cultivation, economically and efficiently.

"The Strawberry in North America." By S. W. Fletcher, 8vo. 234 pp. (Macmillan, London, 1917.) 8s. net.

The British fruit-grower will find this work by Mr. Fletcher, Professor of Horticulture at the Pennsylvania State College, full of most valuable information from beginning to end, and containing matter of considerable interest to the Strawberry growers in this country. It appears that the cultivation of Strawberries in America was in its infancy about 1800; now the quantity grown for market is enormous, and the varieties almost countless, many of them raised by careful hybridization, the origin of the best being recorded. Some of these varieties have spread all over Europe. The pecuniary reward in Strawberry breeding does not appear to be large. The author says "some men raise thousands of seedlings without producing one that they consider worthy of introduction." The early history of the North American type and its origin is full of excellent matter, and the beginning of garden and commercial cultivation is also dealt with. The introduction of a variety which was highly esteemed in Britain, viz., Keen's Seedling, many years ago, and then found in every garden, will be remembered by most of the old school; it was one of the parents of our present well-known and popular varieties.

Breeding for a specific purpose is one of the subjects dealt with in a clear and desirable manner that should enable the breeder to avoid many pitfalls. However, soil, situation, and other conditions have such an influence on Strawberries, that one that is first-class in one place may be worthless in another, as proved not only in this country, but also in America. We heartily commend this book to all interested in this popular fruit. It is boldly printed, nicely illustrated, capitally indexed, and of handy size.

"Botany: A Text-Book for Senior Students." By D. Thoday. Ed. 2. 8vo. xix + 524 pp. (University Press, Cambridge, 1919.) 7s. 6d. net.

We noticed the first edition of this useful book when it first appeared (see JOURNAL R.H.S. xli. p. 481), and now need only to say that chapters dealing with the cryptogams have been added so as to make the volume a still more useful one to a wider range of students.

"Botany: The Modern Study of Plants." By M. Stopes. 125 pp. New Issue.

"The Evolution of Living Organisms." By E. S. Goodrich. 125 pp. New Issue. (Nelson, London, 1919.) 1s. 3d. each net.

These new issues of "The People's Books" are both improvements upon good little books, revised and brought up to date by the addition of new matter. They were noticed when they first appeared. (See JOURNAL R.H.S. xxxviii. pp. 586, 594.)

"An Introduction to the Study of Plants." By F. E. Fritsch and E. J. Salisbury. Ed. 2. 8vo. viii + 397 pp. (Bell, London, 1917.) 5s. net.

Many elementary text-books of botany in the past have paid too great attention to the explanation of terms, so that some have seemed little more than a running commentary upon the words peculiar to descriptive botany. Others appear to inculcate the idea that the end of botanical science is to enable one to "run down" a plant. A few introduce chapters upon plant physiology.

Latterly a new, and as we believe, better and more logical spirit has come over botanical teaching, so that the central idea is the plant and its mode of life with inquiry by observation and experiment into the means by which nutrition, growth, and reproduction are effected in the different circumstances in which plants grow. No elementary book we have seen carries out this idea so well as the present one, and we can therefore most heartily recommend it to the beginner in botanical study. It is an innovation in botanical text-books to find a chapter devoted to a consideration of the soil, and an innovation almost as revolutionary in conception as it is good in execution.

The usual features of an elementary botanical text-book are of course present, and in addition to the chapter mentioned above an excellent elementary account of the vegetation of typical habitats in England, such as woodlands, sand dunes, rocks, and so on, making an admirable introduction to the subject of plant ecology.

"Soil Biology: Laboratory Manual." By A. L. Whiting, Ph.D. 8vo. ix + 143 pp. (Chapman & Hall, London, 1917.) 6s. net.

Soil Chemistry and, to a certain extent, Soil Physics have long since found their place in school and college courses in Agriculture; but the equally important biological aspect of soil conditions has not only been less studied, but even those parts that are most intimately known have been more or less neglected as subjects of practical study in such courses. This is not as it should be, and it is to be hoped that this little book of practical exercises and questions will help to introduce this side of soil science more to the notice of the teacher and bring it more prominently before those framing courses of instruction for agricultural and horticultural students. The proof of the pudding is in the eating, and until the exercises contained in this little book have been worked through practically and their practicability determined, it is too soon to speak of the merits of the exercises in detail, but at any rate it is plain that the plan of the book is good, and to follow out its exercises cannot fail to be of value to the student.

"The Natural Organic Colouring Matters." By A. G. Perkin and A. E. Everest. 8vo. xxii + 655 pp. (Longmans, Green & Co. London, 1918.) 28s. net.

This volume forms one of the series of Monographs on Industrial Chemistry edited by Sir E. Thorpe. It deals with the natural organic dyestuffs and takes no account of those colouring matters such as chlorophyll, hæmoglobin, and the carotinoids, which possess no real tinctorial properties. It is quite rational to exclude pigments of the latter type, which form a class apart, the inclusion of which in a monograph on Industrial Chemistry would be unwarrantable; but the title of the book is slightly misleading if read literally. The natural organic dyestuffs themselves form a sufficiently big subject, and it is not surprising that the book runs to nearly seven hundred pages.

As is to be expected from authors so well qualified to deal with this subject, a most comprehensive and detailed account of the occurrence, extraction, constitution, properties, and uses of the natural organic dyestuffs is given. Indeed, it is doubtful whether so exhaustive a treatise can truly be described as a monograph in the usually accepted sense of the term at the present time, as applied to members of series of books devoted to special groups of subjects, namely a short, concise (and therefore moderately priced) volume giving the essentials of a subject, and capable of being readily brought up to date and reissued from time to time. A book of the size and price of that under review scarcely answers this description. However, it must not be thought that we quarrel with the subject matter or with its presentation: both are excellent.

The dyestuffs are classified according to the chemical constitution of their main tinctorial constituents. As examples of the scope of the book it may be mentioned that seventy-eight pages are devoted to the anthraquinone group, including madder, cochineal, and kermes; one hundred and ten pages to the γ pyran group of anthocyanin dyestuffs; and fifty-four pages to the indole group, including indigo, woad, and Tyrian purple. A chapter is included on the tannins, which, although not strictly dyestuffs, are of importance in dyeing operations, and a short account is also given of lakes formed from vegetable colouring matters. A list of natural dyestuffs classified according to their botanical origin forms a useful Appendix. A valuable feature is the wealth of scientific and historical references to the original literature.

The text is on the whole clearly written, though the style is awkward at times, and there are a few evidences of inadequate proof correction, such as "exicator," "unusual great solubility," and "to invariably accompany." These are minor blemishes, and the book can be unhesitatingly recommended as a valuable work of reference to all interested in the chemistry of the natural organic dyestuffs.

"Recent Advances in Organic Chemistry." By Alfred W. Stewart, with an Introduction by J. Norman Collie. Third edition. 8vo. xix + 350 pp. (Longmans, Green & Co. London, 1918.) 14s. net.

The previous editions of Dr. Stewart's well-known book were outstanding examples of his happy faculty of combining lucid exposition with shrewd criticism, in an eminently readable form. This new edition is certainly not inferior to its predecessors in these respects, and is sure of a hearty welcome from all organic and bio-chemists. Research workers will find it most useful in keeping abreast of progress in fields other than their own, while for advanced students its influence in encouraging their critical faculty and in suggesting subjects for research should be invaluable.

It is significant of the healthy reaction in favour of the study of the organic

chemistry of vital products that more than two-thirds of the volume are devoted to substances belonging to this category. Few will disagree with the author in welcoming this return to nature, but we must differ from him when he states that "It is surprising to find how many subjects for research have been unearthed among the substances which go to build up animal and vegetable structures" (p. 2). Subjects for research do not need unearthing in this field, which on the contrary simply bristles with them. It is rather the complexity of most vital products and the intricacy of vital processes which in the past have hindered the prosecution of fruitful research in biochemistry. Indeed, recent triumphs in the synthesis of vital products have been achieved only as a result of the earlier work on the manifold reactions of the simpler carbon compounds. Moreover, it is doubtful whether any real advance will be made in elucidating the mechanism and nature of vital reactions until the physical chemist has won a clearer insight into the properties of colloids, to quote a conspicuous example.

The first chapter is now devoted to a survey of the main lines of research in the present century. The chapters on the terpenes do not differ sensibly from those in the previous edition. The chapter on rubber contains a trenchant criticism of Harries' work and theories, while the large amount of new work on the alkaloids is clearly reviewed in the chapter on these bodies. After a short account of the polypeptides, twenty pages are devoted to Willstätter's researches on chlorophyll, of which a lucid account is given, though the subject is too complex for really satisfactory treatment in so short a space. After a chapter on Willstätter's remarkable researches on the anthocyanins, we come to what is in many ways the most fascinating chapter in the book. This is based largely on a private communication from Prof. Collie, and in it the author shows in detail how the course of the natural syntheses of the various classes of vital products can be formulated in the light of present-day knowledge of organic chemistry. Succeeding chapters deal with the organic chemistry of arsenic and with the structure of triphenyl methyl. Perhaps the least satisfactory chapter is that headed "Other elements which exhibit abnormal valency." The subject is undoubtedly an important one, but the present state of our knowledge scarcely justifies the space devoted to some of the inconclusive work recorded. The author is again at his best in the final chapter, in which he gives an illuminating and suggestive account of the limitations of existing structural formulæ as an expression of the reactions and reactivity of organic substances.

We have found very few errors, and the only one which calls for comment occurs at the top of p. 263, where the need for a reduction at one stage of the reaction has been overlooked. With regard to the choice of subjects, it is suggested that in a subsequent edition an account should be given of recent important work on the structure of the nucleic acids and of the lipins.

Prof. Collie says in his Introduction: "The text-book is rare that stimulates its reader to ask, Why is this so? or How does this connect with what has been read elsewhere?" Dr. Stewart's book undoubtedly falls into this category.

"A Dictionary of Flowering Plants and Ferns." By J. C. Willis, M.A., Sc.D., F.R.S. Ed. 4. 8vo. xii + 712 + lv pp. (University Press, Cambridge, 1919) 20s. net.

It is with a certain amount of regret that we find this new edition of Dr. Willis' well-known Dictionary does not contain the valuable introductory summary that made the earlier editions something more than a mere dictionary—made them indeed interesting as textbooks dealing with some aspects of botany too often neglected. It is with regret too that we find the serviceable dark blue cover of the earlier replaced by a light blue-grey one in this last edition. These regrets are only not quite turned to whole-hearted approbation when we investigate the contents of the Dictionary itself and find that all the genera of flowering plants are noted, and the book is thus much more complete than in the earlier editions where only the principal ones found a place. The style of the book is too well known to need description, for as a handy book of reference it has been in constant use by botanists and those who need to refer to plant names and uses for many years, and we can confidently predict a wider usage now it is more complete.

"The Preparation of Substances Important in Agriculture." By C. A. Peters, Ph.D. Ed. 3. 8vo. vii + 81 pp. (Chapman and Hall, London, 1919) 4s. net.

This is best described as a series of laboratory exercises with notes upon the preparation of manures and insecticides, and is to be used by students working in the laboratory, not as a guide to the manufacturer.

"Firewoods: their Production and Fuel Values." By A. D. Webster. La. 8vo. ix + 95 pp. (Fisher Unwin, London, 1919.) 12s. 6d. net.

Renewed attention has perforce been directed to the use of wood as fuel, and where it can be procured who would not rather have a wood fire than a coal one? This book contains a great deal of valuable information concerning the relative values of various woods as fuel and a reprint of the wood-fuel order issued under D.O.R.A. A cheap edition would find a wider public.

"Commercial Forestry in Britain: Its Decline and Revival." By E. P. Stebbing. 8vo. vi + 186 pp. (John Murray, London, 1919.) 6s. net.

Amongst the many books that have of late appeared on the important question of afforestation and our timber supplies "Commercial Forestry" must hold first place. It is candid, moderate, and written by one who has evidently studied the subjects in all its phases.

For convenience of reference the book is divided into three parts—the past, the War period, and the future. These are again sub-divided into various chapters, which give in a very concise manner the history of our woodlands and what we know of the old forests of our country, their past history, and the cause of their present absence.

Commencing with the Roman period, when Julius Cæsar described the face of England as "one horrible wood," the history of British forestry up to the passing of the "Statute of Enclosure" in 1482 is quickly reviewed, fuller details being given from that date to the appointment of a Parliamentary Committee on Forestry in 1885, and onwards to the outbreak of the Great War in 1914. To those who are interested in our timber supplies, it is sad to read of the wholesale devastation of our woods that took place during the Civil War, or from about the beginning of the fifteenth century on to the Restoration, when whole forests were razed to the ground or laid waste by the most ruthless destruction.

From the evidence of John Evelyn in England, from the statement of various writers of authority in Scotland, and from authentic Irish records, extensive and valuable forests extended throughout the three kingdoms up to the beginning of the sixteenth or middle of the seventeenth century. From that date onwards we have many accounts of wholesale and wanton destruction, to which the attention of successive Governments was in vain directed. Cromwell recognized the importance of preserving our woodlands and appointed woodreeves to look after the valuable forests of oak that were becoming fast denuded in Central and Western Ireland, from which in 1611 no less than 20,000 trees were marked for the King's use in two of the southern counties.

In Scotland, which was originally well wooded, we find that a dearth of timber was being felt, and in the early years of the seventeenth century, extensive planting operations were undertaken by the far-seeing Duke of Atholl and other enterprising landowners, and to-day these are the very plantations from which the finest coniferous timber for carrying on the War was obtained. On no less than seven occasions during the past thirty-two years has the question of afforestation been brought before Parliament, while private conferences would about treble that number.

The present Afforestation Scheme has been fully gone into by Mr. Stebbing, and our views quite coincide with his, that not only is the proposed area—1,700,000 acres—too small, but the period over which the planting is to be engaged is too long to be of any practical value in the near future with reference to our timber demands. Originally our own suggestion was that 5,000,000 acres should be planted, but strong opposition caused us to reduce the area to 3,000,000, and latterly to 1,000,000 acres, the whole to be planted in twenty-five years.

Regarding State-owned forests, this is a point with which we are in full accord, as only the State can provide the necessary capital or acquire land on the most favourable terms and in sufficient quantity for any large scheme of afforestation, and the resources and continuity of a nation will always make it the best custodian of forest property. Private individuals labour under many disadvantages, particularly in the length of time required before the money expended on planting can be even partially repaid. Forest education and schools of forestry come in for a share of attention, but though we are by no means averse to "a sound, scientific training in the theory of the subject," yet let this be in conjunction with the practical, for past experience and the present condition of Scottish woods clearly point out that in order to produce the best class of foresters, a thorough training on a well timbered estate is absolutely necessary. We cannot agree with the author when he condemns notch planting with the spade as a pernicious practice, for have not many of the most successful northern woods, and from which the finest larch and Scotch fir timber for war purposes were obtained, been so formed? But altogether

Mr. Stebbing's book is by far the best contribution to the subject of commercial forestry that has appeared in this or any other land, and we hope it may be the means of hastening on the valuable but long overdue work of the Forestry Sub-Committee of Reconstruction.

"Our National Forests: A Short Popular Account of the Work of the United States Forest Service on the National Forests." By Richard H. D. Boerker. 8vo. lxix + 238 pp. (Macmillan, New York, 1919.) \$2.50.

The author truly says that the practice of forestry has become an important part in the household economy of civilized nations, and that through misuse of its forest resources destruction is quickly followed by timber famines, floods, and erosion. Probably one of the greatest achievements in the history of forest conservation is the bringing under administration and protection the vast woodlands of the United States, which roughly extend to 155,000,000 acres. Having from time to time read much that has been written regarding these forests, we can confidently say that the present book contains in readily accessible form a far larger amount of useful information regarding the past, present, and future of these woodlands than has before been contained in a single volume. The contents are divided into four headings: (1) The Creation and Organization of the National Forests; (2) The Administration of the National Forests; (3) the Protection of the National Forests; and (4) The Sale and Rental of National Forest Resources.

It may be a surprise to many that 15,000,000 acres of national forest lands, which are capable of producing timber and valuable chiefly for that purpose, have been denuded of their original tree growth. These lands are not adapted to either agriculture or grazing and in their present condition are practically unproductive barrens. The methods of reforestation, either by direct seed-sowing or by tree-planting, are very clearly set out, and, though akin to those practised in this country, contain much that is worthy of copying, whether as to the best ways of rearing young forest trees or selecting, harvesting, and sowing the various seeds of desirable coniferous and hardwooded species. In the last chapter, which deals with the sale and disposal of national forest timber, the methods of lotting, advertising, and checking are worthy of imitation, while the system of issuing grazing permits does away with unnecessary trespass as well as insuring that the fees are converted into the right channel.

Short notes on tree diseases, insect attacks, and injury from flood and fire are all welcome; indeed, within the 230 pages is contained a mine of useful information regarding the trees of which the vast forests of the United States are mainly composed.

The book is beautifully and copiously illustrated, the illustrations being of distinct value in elucidating the text.

"Botany of the Living Plant." By F. O. Bower, Sc.D., F.R.S. 8vo. x + 570 pp. (Macmillan, London, 1919.) 25s. net.

A considerable time has elapsed since the appearance of an altogether new botanical text-book for fairly advanced students so complete, so clear, and so authoritative as this. It is indeed a more scientific but no less lucid account of plant life than Kerner's "Natural History of Plants." It gives a straightforward account of the structure and functions of plants, illustrated by examples taken from various parts of the world, and, where necessary, by capital drawings, many of them especially, and skilfully, made for this work. A feature of great value is the italicized sentence or two summing up each of the important facts and principles of botany as they are dealt with. Where subjects are still matters of speculation the different opinions held are generally clearly stated, but here and there a comparatively new view of a special and restricted phenomenon is omitted. Thus the explanation of the variety of flowers and difference in habit of different parts of the curious *Cytisus Adami* is readily understood on Winkler's hypothesis of a chimera, and this affords a more satisfactory explanation of all the facts than the one given. The book is one which should be available to every student, and we hope that circumstances may soon permit a reduction in price.

"Gardening Illustrated" and "Farm and Home," established some thirty odd years ago by Mr. Wm. Robinson, have changed hands.

They are now the property of Mr. John Nayler, J.P., who has been associated in the management of both papers for the past few years.

NOTES ON RECENT RESEARCH
AND
SHORT ABSTRACTS FROM CURRENT PERIODICAL
LITERATURE, BRITISH AND FOREIGN,
AFFECTING
HORTICULTURE & HORTICULTURAL SCIENCE.

THE EDITOR desires to express his grateful thanks to all who have so willingly assisted in making abstracts. He would be glad if any who have time and who are willing to help in any special direction in making the abstracts more complete would communicate with him.

NAMES OF THOSE WHO HAVE KINDLY CONSENTED TO HELP
IN THIS WORK.

Archer, F. G., F.R.H.S.
Baker, F. J., A.R.C.Sc., F.R.H.S.
Ballard, E., F.R.H.S.
Bowles, E. A., M.A., F.L.S., F.E.S., F.R.H.S.
Brennan, A., B.Sc., F.R.H.S.
Bunyard, E. A., F.L.S., F.R.H.S.
Cavers, Prof. F., D.Sc., F.R.H.S.
Cayley, D. M., F.R.H.S.
Chittenden, F. J., F.L.S., F.R.H.S., V.M.H.
Clayton, C. P., F.R.H.S.
Darlington, H. R., F.R.H.S.
Dykes, W. R., M.A., F.R.H.S.
Edwards, L. C.
Ellis, E. T., F.R.H.S.
Gibson, G. W., F.L.S., F.R.H.S.
Gough, G. C., B.Sc., A.R.C.Sc., F.R.H.S.
Groom, Professor Percy, M.A., D.Sc., F.L.S., F.R.H.S.
Hennessey, J. E. W. E., B.A., B.Sc.
Henslow, Rev. Professor Geo., M.A., F.L.S., F.R.H.S., V.M.H.

Hodgson, M. L., F.R.H.S.
 Hooper, Cecil H., M.R.A.C., F.R.H.S.
 Jeffery, Violet G., F.R.H.S.
 Kerridge, Rev. A. A., M.A., F.R.H.S.
 Lake, G. D., F.R.H.S.
 Ludford, R. J., F.R.H.S.
 Newstead, Professor R., A.L.S., F.E.S., F.R.S., F.R.H.S.
 Pethybridge, G. H., B.Sc., Ph.D., F.R.H.S.
 Petts, Alger, F.R.H.S.
 Ramsbottom, J. K.
 Rendle, A. B., M.A., D.Sc., F.L.S., F.R.S., F.R.H.S., V.M.H.,
 Reuthe, G., F.R.H.S.
 Rolfe, R. A., A.L.S., F.R.H.S.
 Ross, R. C. S., F.R.H.S.
 Scott Elliot, G. F., M.A., B.Sc., F.L.S., F.R.H.S., F.R.G.S.
 Simmonds, A., F.R.H.S.
 Smith, William G., B.Sc., Ph.D., F.R.H.S.
 Veitch, Sir Harry J., F.L.S., F.Z.S., F.R.H.S.
 Webster, A. D., F.R.H.S.
 Whittles, W., F.R.H.S.
 Williams, S. E., F.R.H.S.
 Wilson, Gurney, F.L.S., F.R.H.S.
 Wilson, G. F.

JOURNALS, BULLETINS, AND REPORTS

from which Abstracts are made, with the abbreviations used for their titles.

Journals, &c.	Abbreviated title.
Agricultural Gazette of New South Wales	Agr. Gaz. N.S.W.
Agricult. Journal, Cape of Good Hope	Agr. Jour. Cape G.H.
American Journal of Botany	Amer. Jour. Bot.
Annales Agronomiques	Ann. Ag.
Annales de la Soc. d'Hort. et d'Hist. Naturelle de l'Hérault	Ann. Soc. Hê.
Annales de la Soc. Nantaise des Amis de l'Hort.	Ann. Soc. Nant. des Amis Hort.
Annales des Sciences Naturelles	Ann. Sc. Nat.
Annales du Jard. Bot. de Buitenzorg	Ann. Jard. Bot. Buit.
Annals of Applied Biology	Ann. Appl. Biol.
Annals of Botany	Ann. Bot.
Annual Report Agricultural Research Station, Long Ashton	Ann. Rep. Agr. Res. Stn., Long Ashton.
Beih. zum Botanischen Centralblatt	Beih. Bot. Cent.
Boletim da Real Sociedade Nacional de Horticulura	Bol. R. Soc. Nac. Hort.
Boletim da Sociedade Broteriana	Bol. Soc. Brot.
Bollettino della R. Società Toscana d'Orticulura	Boll. R. Soc. Tosc. Ort.
Botanical Gazette	Bot. Gaz.
Botanical Magazine	Bot. Mag.
Bulletin de la Société Botanique de France	Bull. Soc. Bot. Fr.
Bulletin de la Soc. Hort. de Loiret	Bull. Soc. Hort. Loiret.
Bulletin de la Soc. Mycologique de France	Bull. Soc. Myc. Fr.
Bulletin Department of Agricult. Brisbane	Bull. Dep. Agr. Bris.
Bulletin Department of Agricult. Melbourne	Bull. Dep. Agr. Melb.
Bulletin of the Botanical Department, Jamaica	Bull. Bot. Dep. Jam.
Bulletin of Bot. Dep. Trinidad	Bull. Bot. Dep. Trin.
Canadian Reports, Guelph and Ontario Stations	Can. Rep. G. & O. Stat.
Centralblatt für Bacteriologie	Cent. f. Bact.
Chronique Orchidéeenne	Chron. Orch.
Comptes Rendus	Comp. Rend.
Contributions from U.S.A. Herbarium	Contr. fr. U.S.A. Herb.
Department of Agriculture, Victoria	Dep. Agr. Vict.
Department of Agriculture Reports, New Zealand	Dep. Agr. N.Z.
Dictionnaire Iconographique des Orchidées	Dict. Icon. Orch.
Die Gartenwelt	Die Gart.
Engler's Botanische Jahrbücher	Eng. Bot. Jah.
Gardeners' Chronicle	Gard. Chron.
Gartenflora	Gartenflora.
Journal de la Société Nationale d'Horticulture de France	Jour. Soc. Nat. Hort. Fr.
Journal Dep. Agriculture, Victoria	Jour. Dep. Agr. Vict.
Journal Imperial Department Agriculture, West Indies	Jour. Imp. Dep. Agr. W.I.
Journal of Agricultural Research	Jour. Agr. Res.
Journal of Agricultural Science	Jour. Agr. Sci.
Journal of Botany	Jour. Bot.
Journal of Chemical Society	Jour. Chem. Soc.
Journal of Ecology	Jour. Ecol.
Journal of Economic Biology	Jour. Econ. Biol.
Journal of Economic Entomology	Jour. Econ. Entom.
Journal of Genetics	Jour. Gen.
Journal of the Board of Agriculture	Jour. Bd. Agr.
Journal of the Linnean Society	Jour. Linn. Soc.
Journal of the Royal Agricultural Society	Jour. R.A.S.
Journal of the Society of Chemical Industry	Jour. Soc. Chem. Ind.

Journals, &c.	Abbreviated title.
Journal S.E. Agricultural College, Wye . . .	Jour. S.E. Agr. Coll.
Kaiserliche Gesundheitsamte . . .	Kais. Ges.
La Pomologie Française . . .	Pom. Franç.
Le Jardin . . .	Le Jard.
Lebensgeschichte der Blütenpflanzen Mitteleuropas	Lebens. d. Blütenpfl.
Mycologia . . .	Mycologia. *
Naturwiss. Zeitschrift Land und Forst. . .	Nat. Zeit. Land-Forst.
New Phytologist . . .	New Phyt.
Notizblatt des Königl. Bot. Gart. und Museums zu Berlin . . .	Not. König. Bot. Berlin.
Oesterreichische Garten-Zeitung . . .	Oester. Gart. Zeit.
Orchid Review . . .	Orch. Rev.
Orchis . . .	Orchis.
Phytopathology . . .	Phytopathology.
Proceedings of the American Pomological Society	Am. Pom. Soc.
Quarterly Journal of Forestry . . .	Quart. Jour. of Forestry.
Queensland Agricultural Journal . . .	Qu. Agr. Journ.
Report of the Botanical Office, British Columbia .	Rep. Bot. Off. Brit. Col.
Reports of the Missouri Botanical Garden . . .	Rep. Miss. Bot. Gard.
Revue de l'Horticulture Belge . . .	Rev. Hort. Belge.
Revue générale de Botanique . . .	Rev. gén. Bot.
Revue Horticole . . .	Rev. Hort.
The Garden . . .	Gard.
Transactions Bot. Soc. Edinburgh . . .	Trans. Bot. Soc. Edin.
Transactions of the British Mycological Soc. . .	Trans. Brit. Myc. Soc.
Transactions of the Massachusetts Hort. Soc. . .	Trans. Mass. Hort. Soc.
Transactions Royal Scot. Arboricultural Soc. . .	Trans. Roy. Scot. Arbor. Soc.
U.S.A. Department of Agriculture, Bulletins . .	U.S.A. Dep. Agr.*
U.S.A. Experimental Station Reports . . .	U.S.A. Exp. Sta.†
U.S.A. Horticultural Societies' publications . .	U.S.A. Hort. Soc.†
U.S.A. State Boards of Agriculture and Horticulture	U.S.A. St. Bd.†
Woburn Experiment Farm Report . . .	Woburn.

* The divisions in which the U.S.A. Government publish Bulletins will be added when necessary.

† The name of the Station or State will in each case be added in full or in its abbreviated form.

NOTES AND ABSTRACTS.

Agave fourcroydes Lem. By A. Berger (*Bot. Mag.* t. 8746; 1918).—Native of Yucatan. The species which supplies from its leaves the fibre known as Henequen. It is grown in most tropical and semi-tropical countries, and is sometimes used as a hedge plant. Reproduction is provided for by seeds, viviparous bulbils which arise on the panicle, and also by suckers. The inflorescence is 18-21 feet high, slightly curved at the top. The flowers are yellowish-green, 2½-3 inches long.—L. C. E.

Alnus firma Sieb. et Zucc. var. **Yasha**. By S. A. Skan (*Bot. Mag.* t. 8770; 1918).—Native of Japan. A small tree belonging to the section of the genus characterized by having the female inflorescences in terminal racemes, which make their appearance in spring. The leaves are ovate-lanceolate, glabrous above, adpressed pubescent beneath, lateral nerves ten to sixteen on each side of the midrib, nearly parallel. Male catkins, solitary or in pairs, female catkins in terminal racemes of two to five together.—L. C. E.

Angraecum gracilipes Rolfe (*Bot. Mag.* t. 8758; 1918).—Native of Madagascar. A species first grown in this country under the name of *A. recurvum*, from which it differs in its greatly elongated pedicels and its much larger leaves. *A. gracilipes* thrives well under the same treatment as that required for *A. eburneum*. The flowers are white and very showy.—L. C. E.

Aphides, Apple. By F. V. Theobald (*Jour. Bd. Agr.* vol. xxvi. No. 1, April 1919).—A full account of the following three of the four aphides of general importance recorded as attacking the apple in Great Britain:—Blue Bug or Rosy Apple Aphis (*Aphis malifoliae*), Green Apple Aphis (*Aphis pomi*), and the Oat Apple Aphis (*Siphocoryne avenae*). The fourth, which is not treated in this article, is the Woolly Aphis or American Blight. The life histories are given, and an account of the damage done. Prof. Theobald advocates "preventive treatment" in autumn, either by spraying or dusting trees to kill exposed oviparous females and prevent egg-laying. It must be thoroughly done, as a few females left will deposit eggs from which numerous young will be produced the following spring. Spraying in spring, when buds are swelling, with a wash compound of 1 to 1½ cwt. lime, 5 lb. salt, 100 gallons water, is also advocated, as this kills newly-hatched aphides, while those hatched later are prevented from entering the opening buds. Soft-soap and water, nicotine, or pyridine are all recommended for use later.—G. C. G.

Aphids, Economic, Alternation of Hosts in. By W. M. Davidson (*Jour. Econ. Entom.* vol. xi. June 1918, pp. 289-294).—Of the twenty-one economic species with alternate host habits mentioned in this paper, at least fourteen are common to Europe as well as America.

Whilst the author is considering these aphids' habits in America only, the alternate hosts are of interest here.

The Hop Aphis (*Phorodon humuli*) alternates between hop and plum. Black Cherry Aphis (*Myzus cerasi*) between cherry and Lepidium. Bean Aphis (*Aphis rumicis*) feeds in summer on Leguminous and Chenopodiaceous plants. Woolly Aphis (*Eriosoma lanigerum*) apple and pear, and passes the winter in a dormant state on elms. Oat Aphis (*Aphis prunifoliae*) reproduces all the year round in semi-tropical zone and winters in the north on apple. Peach Aphis (*Myzus persicae*) has a long list of hosts, mostly cultivated plants.

Many species are of economic importance at one period of the year only. The alternating host being a weed, it provides another excellent reason why certain weeds at least should be destroyed. Examples of such aphides are: *Rhopalosiphon ladiucae*, which migrates between currant, gooseberry, and sow-thistle (*Sonchus*). *Aphis malifoliae*, apples, rib-grass, and plantains. *Hyalopterus arundinis*, the mealy plum aphid which passes the summer on reeds. The paper concludes with a useful bibliography covering two pages.—G. W. G.

Aphids injurious to Orchard and Bush Fruits. By A. L. Quaintance and A. C. Baker (*U.S.A. Dep. Agr. Bur. Entom., Farm. Bull.* 804, April 1917; 30 figs.).—Contact sprays such as kerosene emulsion, soap washes, nicotine solutions, etc., must be used to kill aphids. Directions for applying and preparing them are given in this bulletin.—V. G. J.

Aphis, Red Currant, Myzus ribis. By M. D. Haviland (*Proc. Roy. Soc. Edin.* 39, pp. 78–112; with 9 figs.).—This paper deals with the life history and bionomics of this well-known Aphis, whose life cycle had never been determined. The stem-mother Aphis hatches in April, passes a three weeks' larval period, producing red blisters on the leaves. (These are not caused by the young Aphides, produced in early May, as was thought by many.)

It is migratory to Labiatae and other weeds during the summer, but the migration is not essential, as the whole life cycle may be passed on Currant. After migration it has been described as a different species, *Phorodon galeopsidis*. *M. whitei*, recorded from England, and *M. dispar*, recorded from America, may both be proved to be identical with *M. ribis*.

Winged forms were less productive and shorter-lived than wingless.

It has both predaceous and parasitic enemies, particularly a small parasitic Braconid, *Aphidius ribis*.

The bushes should be sprayed with nicotine solution or paraffin emulsion in April as soon as the buds open, and again in early May. Where small numbers are present, pick off blistered leaves.—G. F. W.

Asparagus falcatus Linn. By C. H. Wright (*Bot. Mag.* t. 8751; 1918).—Native of Ceylon; Tropical and Extratropical South Africa. A species which has long been in cultivation as a greenhouse climber, and is sometimes confused with *A. Sprengeri*. The flowers are borne in racemes and are white in colour and sweet scented. This species thrives best in a poor gravelly soil and can be propagated, either by seeds or cuttings taken from the smaller branches.

L. C. E.

Beans susceptible to Mosaic, Additional Varieties of. By D. Reddick and V. B. Stewart (*Phytopathology*, ix, pp. 149–152, March 1919).—The authors give a long list of varieties of bean which they found to be susceptible to mosaic disease in addition to those already reported. 'Robust' has proved immune, and this is so far the only one proved to be so.—F. J. C.

Beans, Varietal Susceptibility to Strains of Colletotrichum Lindemuthianum. By M. F. Barrus (*Phytopathology*, viii, pp. 598–614, Dec. 1918; plates).—More than one strain of the fungus, *Colletotrichum Lindemuthianum*, exists, and while some varieties of bean (*Phaseolus vulgaris*) are resistant to one, they are liable to attack by another strain. The source of immunity is thus probably different from that of immunity of other species of plant either nearly or distantly related to the bean. Black-eyed varieties appear to be markedly susceptible. Lists of inoculations and their results are given.—F. J. C.

Bee Poisoning, Blossom Spraying and. By Jas. Troop (*Jour. Econ. Entom.* vol. xi, October 1918, p. 433).—A brief account of experiments in hand to ascertain the effect of arsenicals as a blossom spray is given. The programme is designed to cover both field and laboratory requirements, and it is proposed to publish in detail the results obtained after another year's work. So far as the laboratory work goes it has been found that less than 0.000005 grammes of arsenic (As_2O_3) proves fatal to a bee. This result appears to indicate that bees may be killed by an arsenical poison spray at blossom time.—G. W. G.

Berberis Beaniana Schneider. By W. J. Bean (*Bot. Mag.* t. 8781; 1918).—Native of Szechuan. A hardy Barberry, 8 to 10 feet high. The leaves are deciduous, dark green above, rather glaucous beneath. The flowers are rich yellow, $\frac{1}{2}$ inch across, produced in June in corymbose panicles from the axils of the leaves. The fruits are bright purple, $\frac{3}{4}$ in. long.—L. C. E.

Bulbophyllum Hamelinii Rolfe (*Bot. Mag.* t. 8785; 1918).—Native of Madagascar. A plant which thrives well in the tropical house. It can easily be distinguished from other members of the genus by the pseudo-bulbs which are concave on one side and convex on the other. The flowers, medium-sized, suffused and blotched with purple and with a dark purple lip, are borne in a drooping raceme, 4 to 5 inches long.—L. C. E.

Bulbophyllum sociale Rolfe (*Bot. Mag.* t. 8761; 1918).—Native of Sumatra. A plant for the tropical house, growing well under the cultural treatment suitable for *B. virescens*. The flowers are showy, deep orange, slightly veined with red; the lip is rose-coloured and long-clawed.—L. C. E.

Calcium Arsenite and Arsenate as Insecticides. By E. B. Holland and J. P. Buckley (*Jour. Econ. Entom.* vol. xi. August 1918, pp. 354-357).—It is suggested in the circumstances occasioned by the war it may be necessary to find other sources of arsenicals in addition to those usually employed. Calcium arsenite and C. arsenate have been used in the past and careful tests were made to ascertain how far they could be safely used. The arsenite salt is fairly insoluble in the presence of excess lime and contains 77.92 per cent. arsenic trioxide; spraying tests showed some injury even when mixed with strong (3 per cent.) lime water. Much the same remarks apply to the arsenate which is practically insoluble in lime water. For a safe application an admixture of lime water or Bordeaux mixture is indicated.—G. W. G.

Calosoma Beetle (*Calosoma sycophanta*). By A. F. Burgess (*U.S.A. Dep. Agr. Bur. Entom., Bull.* 251, July 1915; 7 plates, 1 map, 3 tables, 3 figs.).—This insect is known to occur in France, Germany, Switzerland, Italy, and other European countries, being particularly abundant in cases where there are unusual outbreaks of destructive caterpillars. Its good work is mentioned in a number of European writings, and it is known to prey extensively on the Gypsy moth and the Pine sawfly.

It has been introduced into New England, and has now become well established. It is reproducing satisfactorily, and has already demonstrated that it is a very important factor in the control of the Gypsy moth by natural enemies.—V. G. J.

Celery Storage Experiments. By H. C. Thompson (*U.S.A. Dep. Agr. Bull.* 579, Sept. 1917; 10 figs.).—Celery is one of the most important truck crops grown in the United States. Six States—New York, Michigan, Massachusetts, Ohio, Pennsylvania, and New Jersey—produce about two-thirds of the celery crop, and a considerable portion of this is stored for from one to three months. The old method of storing celery in the field and in houses of the cellar type is not satisfactory, because temperature and moisture conditions cannot be controlled. The storage of celery in cold-storage warehouses is a comparatively new undertaking, and at present very little is known of the method, though it promises to be very satisfactory if the celery is packed into small crates.—V. G. J.

Cereus Tunilla Weber. By R. A. Rolfe (*Bot. Mag.* t. 8779; 1918).—Cactaceae. Native of Costa Rica. A small spiny shrub, shoots, slender, green and four-angled. The flowers are solitary, lateral, about 2½ inches long and rose-lilac in colour. The fruit is yellow, spiny, and said to be edible.—L. C. E.

Chlorpicrin, Fumigation with. By Wm. Moore (*Jour. Econ. Entom.* vol. xi. August 1918, pp. 357-362).—The discovery of the extremely high toxicity of chlorpicrin to insects has opened up the possibility of its use in fumigating grain and clothing. A careful series of experiments showed that it is much more powerful than carbon-bisulphide and has greater penetrating powers. Providing the seed is dry and thoroughly aired after fumigation, germination is not affected. It will injure neither dress materials nor their colour when free from impurities of chlorine and nitrogen peroxide. At present it cannot be obtained on the market, but inquiries from chemical manufacturers indicate that it can be manufactured and sold at a cheaper rate than CS₂. It also has the advantage of not forming an explosive mixture with air unless unduly heated.—G. W. G.

Cockroach Control, Experiments on. By E. V. Walter (*Jour. Econ. Entom.* vol. xi. October 1918, pp. 424-429).—These experiments show that finely powdered boric acid scattered in the haunts of cockroaches forms an easy and safe means of getting rid of this pest. The more usual mixture of borax and sugar proved to be much less effective. Borax and boric acid are said to be able to kill as a contact insecticide as well as a stomach poison. The method in which the boric acid acts is explained in the following way: Roaches have the habit of extreme personal cleanliness, and if covered with dust or powder will, if unmolested, clean themselves. It is in this way and not as food that the finely powdered boric acid is eaten. If sugar is added the mixture is heavier and is likely to cake, hence the lower efficiency obtained by the mixture as compared with the boric acid alone. Borax will not kill the eggs, hence the powder should remain for some time or the treatment be repeated after a few weeks.—G. W. G.

Cranberry Insect Problems and Suggestions for Solving Them. By H. B. Scammell (*U.S.A. Dep. Agr. Bur. Entom., Farm. Bull.* 860, Dec. 1917; 38 figs.).—An abundant water supply, permitting flooding and reflooding at the proper times, is the best remedy for insect injury in cranberry bogs, and when sites for new bogs are chosen this should be borne in mind.—V. G. J.

Cyanide Fumigation. By H. J. Quayle (*Jour. Econ. Entom.* vol. xi. June 1918, pp. 294-299).—A most interesting paper to those concerned with fumigation of trees under sheets in the field. Emphasizes the difficulty of properly fumigating the lower portion of large trees, without injuring the top: owing to HCN which, when superheated by the reaction, rises at once to the top of the tent or sheet. Formula 2, under tent data on page 298, is wrongly quoted: it should read $\frac{C^3}{4\pi} \left(\frac{O}{2} - C \cdot 144 \right)$. The error is obviously a printer's error, as the equation stated would not give tent volume.—G. W. G.

Dielsia Alliciae Hiern. By S. A. Skan (*Bot. Mag.* t. 8782; 1918).—Scrophulariaceae. Native of South Africa. A herbaceous perennial up to 2½ feet high, not hardy in this country. Leaves opposite, ovate, dentate-serrate. Flowers borne in terminal racemes 2 to 10 inches long, pale rose, with darker blotches at the base of each lip, greenish inside the pouch.—L. C. E.

Double Flowers and Sex Linkage in Begonia. By W. Bateson and I. Sutton (*Jour. Gen.* 8, pp. 199-207; pl.; June 1919).—The results of an investigation into the meaning of doubling in Begonias are given. Both garden forms and the wild species *Begonia Davisii* were used, and the conclusion to which the results point—viz. that all the pollen grains carry the factor for doubling, as do the pollen grains of certain strains of stocks—is remarkable in a wild species, F. J. C.

Drying Plant, A Successful Community. By C. W. Pugsley (*U.S.A. Dep. Agr., Farm. Bull.* 916, Dec. 1917; 9 figs.).—A successful community drying plant for fruit and vegetables is described in this bulletin. Municipalities might well establish plants from public funds, a small charge being made for use of plant at the rate of so much per tray, which would defray the initial expense and pay for the upkeep and working expenses.—V. G. J.

Echeveria setosa Rose. By M. L. Green (*Bot. Mag.* t. 8748; 1918).—Crasulaceae. Native of Mexico. A greenhouse succulent. The leaves are very numerous, probably a hundred or more, crowded together in a dense rosette. The inflorescence is scorpioid, either simple or forked. The flowers are red towards the base and yellow above.—L. C. E.

Erlangea aggregata. By J. Hutchinson (*Bot. Mag.* t. 8755; 1918).—Compositae. Native of Angola. A perennial plant for the greenhouse, attaining a height of 5 to 6 feet. The flower heads are densely clustered, blue flushed with rose. In this country it flowers in midwinter. It can be easily propagated by cuttings from which full-sized plants can be grown in a single season.—L. C. E.

Fumigation Experiments: The Time Factor. By A. F. Swain (*Jour. Econ. Entom.* vol. xi. June 1918, pp. 320-324).—The experiments here enumerated go to prove that with ordinary 8-oz. U.S. Army duck, or similar type of fumigation sheets, an exposure of 45 minutes to the action of HCN gas is as efficient in insect control as any other length of exposure. The reason for this is mainly the diffusion of the gas through the material forming the tent or sheet; and the remarks do not apply to fumigation under an impervious material. The writer's experience of fumigation under similar conditions confirms the conclusions reached by the author.—G. W. G.

Ginkgo, Monœcious. Corporal J. Platts (*Gard. Chron.* April 12, 1919) states, in an account of the Botanic Garden at Bonn, that he saw an interesting specimen of *Ginkgo biloba* about 20 feet high, and divided about 6 feet from the ground by a crotch; one half of the tree is male, the other half female, the latter being weighted down with fruit. The monœcious character was entirely natural and not the result of either budding or grafting, and he failed to see any indications of either.

It may be added that Elwes and Henry in "Trees of Great Britain" mention a similar tree at Vienna, but in this case the female was grafted on the male tree (vol. i. p. 57).—Gerald Loder.

Globe Artichoke, Culture of the. By J. W. Wellington (*U.S.A. Agr. Exp. Sta., New York, Bull.* 435, May 1917; 2 plates, 3 figs.).—The plant is not fully hardy in the colder localities and requires covering to endure the winter. Coal ashes are the most satisfactory material for this purpose. Before mounding with ashes the leaves must be cut back to within a foot of the ground and drawn in about the crown.

Practically only one insect attacks the globe artichoke; this is a black aphid which can be readily controlled by spraying with a solution of Black-leaf 40 and whale-oil soap.—*V. G. J.*

Gongora latisejala Rolfe (*Bot. Mag.* t. 8766; 1918).—Orchidaceae. Native of Colombia. An epiphytic plant for the tropical house. The leaves are elliptic, somewhat recurved and about 10 inches long. The inflorescence is a many-flowered raceme, flowers showy, abundantly dotted with brown spots.—*L. C. E.*

Govenia tingens Poepp et Endl. By R. A. Rolfe (*Bot. Mag.* t. 8768; 1918).—Orchidaceae. Native of Peru. A terrestrial orchid for the tropical house. The leaves are 8 to 12 inches long, recurved, elliptic oblong. The flowers are borne in a many-flowered raceme 4 to 6 inches long. The flowers themselves are medium-sized, whitish, the petals finely rose punctate, the lip greenish yellow.—*L. C. E.*

Horse-Radish Flea-Beetle, The: Its Life-history and Distribution. By F. H. Chittenden (*U.S.A. Dep. Agr., Bur. Entom., Bull.* 535, June 1917; 6 figs.).—The growing of horse-radish in the North is menaced by the introduction from Europe of a small insect known as the horse-radish flea-beetle (*Phyllotreta armoraciae* Koch). The species passes the winter in hibernation as a beetle and comes out in its northern range in April and May.

No systematic control has yet been adopted.—*V. G. J.*

Howea Belmoreana Becc. By C. H. Wright (*Bot. Mag.* t. 8760; 1918).—Palmae. Native of Lord Howe Island. A close ally of *H. Fosteriana* and often confused with it. Both these palms require an intermediate temperature and are very useful as decorative plants owing to the fact that they bear rough usage better than most palms. The leaves are clustered at the top of the stem, 7 to 8 feet long. The flower spikes are produced in the axils of the lowermost leaves, the spadix is drooping, monœcious and about 3 feet long. The flowers are numerous, arranged in groups of three, the two lateral ones male, and the central female.—*L. C. E.*

Hymenoptera Parasitica, Notes on the Bionomics, Embryology, and Anatomy of Certain; especially *Microgaster connexus*. By J. Bronté Gatenby (*Journ. Linn. Soc.* 33, pp. 387-416; 3 figs., 3 plates; 1919).—An account of certain Hymenopterous Parasites and Hyperparasites attacking the larvæ of Cabbage White Butterfly (*Pieris brassicae*), Gold Tail Moth (*Forthesia similis*), and Aphidæ.

The structure of alimentary tract, brain, gut, heart, spinning glands, and tracheal system of *Microgaster connexus* are minutely described, with several new facts regarding the anatomy of its larva, and particularly its abdominal vesicle, whose function appears to be respiratory.

A hyperparasite was found in *Microgaster* larvæ, of which about 10 per cent. were hyperparasitized.

The parasites of Aphidæ are briefly dealt with, and it is stated that no Ichneumonids parasitize Aphids.—*G. F. W.*

Hypericum laeve Boiss. var. *rubra*. By O. Stapf (*Bot. Mag.* t. 8773; 1918).—Native of the Orient. A graceful 'St. John's Wort' which, however, is not quite hardy in this country. The leaves are linear $\frac{1}{2}$ to $\frac{3}{4}$ inch long, dotted with transparent glands. The flowers are small, golden yellow with a scarlet-reddish tinge. In the absence of seeds it can be propagated by cuttings made from the young shoots and attains a height of 1 to 2 feet.—*L. C. E.*

Indigofera pendula Franch. By J. Hutchinson (*Bot. Mag.* t. 8745; 1918).—Native of Yunnan. A graceful shrub of about seven feet in height, dying back to the ground level in winter. The flowers are borne in pendulous racemes from 15-18 inches long and are rose-purple in colour. It is a plant which likes a sunny position and an open well-drained soil; it is as hardy as most of the cultivated *Indigoferas* and like them can be easily propagated by cuttings.

L. C. E.

Infection by certain Fungi, the Relation of Temperature and Humidity to. By J. I. Lauritzen (*Phytopathology*, ix. pp. 7-35, Jan. 1919).—The author found degree of infection to depend largely upon the temperature and to increase rapidly up to a certain point in several plants. The humidity permitting infection varied generally between 92 and 100 per cent., but it was found unnecessary that a film of water should be present over the leaf surface. A bibliography is given.—F. J. C.

Influence of Trees and Crops on Injury by White Grubs, The. By Stephen A. Forbes (*U.S.A. Exp. Stn. Ill., Bull.* 187, Feb. 1916).—Experiments show that more eggs were laid in pastures than in any other crop; small grain came next; fallow land, grown up of weeds, largely grasses, third; clover and corn fourth; and meadow crops—excluding clover—were least sought by the egg-laying beetles.—V. G. J.

Insect Eggs, Toxicity of Organic Compounds to. By W. Moore and S. Graham (*Jour. Agr. Res.* xii. pp. 579-587, March 1918).—Compounds with high boiling-point and slight volatility are more effective for dipping and spraying insects' eggs than are those of low boiling-point and high volatility. Compounds with low boiling-points kill freshly-laid eggs most readily, but those with high are more toxic to eggs containing forward embryos. Paraffin, both of high and low boiling-point, is destructive to old and young eggs. The toxicity of vapour of organic compounds to insect eggs increases with the increase of boiling-point and decrease of volatility.—F. J. C.

Insecticide, A Promising New Contact. By Wm. Moore (*Jour. Econ. Entom.* vol. xi. June 1918, pp. 341-342).—Nicotine oleate may be made directly from any nicotine preparation containing free nicotine. Two and a half parts of a 40 per cent. nicotine solution unites with one and three quarters parts of commercial oleic acid or red oil. Four and one-fourth parts of this soap will then contain one part of nicotine. Nicotine oleate, it is said, will cost the farmer about one dollar per 100 gallons.

Nicotine oleate diluted to give one part nicotine in 1,500 parts of water is efficient against aphides. The oleate may be used to make an oil emulsion spray. Ten parts of kerosine mixed with one and one-quarter part of commercial oleic acid, adding two and one-half parts of 40 per cent. nicotine sulphate well shaken up, forms an emulsion; which is again stirred with ten parts of water. Diluted with 480 parts of water is useful against mealy bugs, white fly, and soft scale. Emulsified with a heavy oil nicotine oleate should be valuable for the destruction of scale insects and eggs on dormant trees. It is important to note that soft water (rain or distilled) is essential with N. oleate.—G. W. G.

Insecticides, Physical Properties governing the Efficacy of Contact. By W. Moore and S. A. Graham (*Jour. Agr. Res.* xiii. June 10, 1918; pp. 523-538; 1 fig.).—These authors continue their observations on Spray Fluids, particularly explaining the difference between "wetting" and "spreading" of contact washes. There must be wetting before there can be spreading, but it does not follow that where there is wetting there must be spreading.

Contact washes may be divided into two classes—(1) those which wet the insect and are able to spread over its body surface and pass up the tracheæ by capillarity; and (2) those which wet the insect and are able neither to spread over the surface nor to gain entrance into the tracheæ.

Oil emulsions may enter the tracheæ as such, or the oil remains after the emulsion is broken down, and may spread over the insect and enter the spiracles.

Tables show penetration of various chemicals, stained with Trypan blue, into insect's tracheæ.—G. F. W.

Insecticides, The Mode of Action of Contact, Observations on. By William Moore (*Jour. Econ. Entom.* vol. xi. December 1918, pp. 443-446).—This paper is a continuation of a paper on the physical properties governing the efficacy of contact insecticides, and gives an account of some highly interesting experiments proving that fat solvents, oils, and soaps are able to penetrate the tracheæ of insects by capillarity and may result in the death of the insect by their purely mechanical action alone. It is necessary for this result to cover all or nearly all of the spiracles. The inferences drawn are that for insects such as plant lice, an insecticide killing in a mechanical way will give good results, but for larger insects it is necessary to add to the wash an insecticide capable of killing in a chemical manner to insure death, as it becomes unlikely that all the tracheæ would be blocked. It is interesting to note in passing that the efficacy of free nicotine sprays has been increased 50 per cent. by the addition of soap. It was

found that some insects, e.g. the clothes louse (*Pediculus corporis*), are able to close the tracheæ so quickly as to keep out soap solution, oils, and xylene. This point may have considerable bearing on the composition of the various types of dips which are likely to be successful.—G. W. G.

Lettuce and Celery, The Handling and Precooling of Florida. By H. J. Ramsey and E. L. Markell (*U.S.A. Dep. Agr. Bull.* 601, Dec. 1917; 16 figs. and tables).—Decay in lettuce in transit was found to be largely due to lettuce drop, a disease which enters the head mainly through the lower leaves. Experimental heads of lettuce were cut just above the two or three lower leaves, and all damaged leaves were removed. Consequently there was far less decay in transit than with the usual method of cutting.

Lettuce in cars that were pre-cooled at the shipping point to a temperature of about 40° F. developed considerably less decay in transit than that in ordinary cars. The combination of careful cutting and precooling enabled the lettuce to reach its destination in perfect condition.

Celery is often injured in transit because it is loaded too high in the cars to permit proper air circulation. Small crates insure more rapid cooling. Pre-cooled celery was stored successfully for four weeks, but stored non-pre-cooled celery developed considerable decay during the same period.—V. G. J.

Linum elegans Spruner. By M. L. Green (*Bot. Mag.* t. 8769; 1918).—Native of Greece. A tufted plant of about 8 inches in height which has not yet been proved hardy in this country. The inflorescence is cymose, two to seven flowered; the petals are yellow, spreading, nearly an inch long. It grows well in a frame, but does not ripen seeds. It can, however, be easily propagated by means of cuttings.—L. C. E.

Macodes Sanderiana Rolfe (*Bot. Mag.* t. 8744; 1918).—Native of the Malay Archipelago. A terrestrial orchid, grown for its attractive foliage, it thrives best in a mixture of sphagnum and peat fibre, under a bell-glass cover. The leaves are ovate-elliptic, 2½–4 ins. long, 1½–2 ins. wide, with handsome yellow reticulate venation on a deep olive-green or greenish-brown ground. These plants very rarely flower and usually die after doing so; the flowers are born in a scape about a foot high and are pale green in colour.—L. C. E.

Malus Sargentii Rehd. By W. J. Bean (*Bot. Mag.* t. 8757; 1918).—Native of Japan. A species closely allied to *M. Toringo* Sieb., but differing from that species in its larger flowers, overlapping petals, and larger fruit. It is perfectly hardy and very attractive both in flower and when in fruit. The flowers are white, about 1 inch wide, opening in May. The fruits are red, depressed globose, ½ to ¾ inch wide.—L. C. E.

Manure, Storage of, and Fly Suppression at Durban Remount Depot. By Chas. K. Brain (*Jour. Econ. Entom.* vol. xi. June 1918, pp. 339–341).—Although the depot contained close on 100,000 animals and was situated in Durban surrounded by inhabitants, the excellent measures adopted for storage of manure and fly suppression prevented any nuisance to the community. The stalls and paddocks were swept with a hard broom daily and the manure and litter carted to huge trenches. The manure was spread to the depth of about a foot and covered with ½ inch of sand, ashes, or earth. It was arranged that the carting of fresh material would be over this surface so that the whole would be added to foot by foot and well pressed down. No disinfectants or lime was added. This method of storing produces a dense peaty mass of manure which analysis shows to be of a very good quality.

It was found necessary after sweeping the stalls to use a contact spray consisting of:

Caustic soda	2 pounds
Boiling water	50 gallons
Paraffin	5 „ } added
Hycol	5 „ } while hot.

Blue-gum branches and pieces of sacking dipped in fly bait were hung about wherever flies tended to congregate. The composition of the fly bait used was:

Arsenite of soda	5 pounds
Black sugar	5–20 „
Water	25 gallons

The usual quantity of arsenite would be about 2½ lb., and as this quantity kills efficiently there seems no useful purpose in increasing it.—G. W. G.

Mealybug, The Common, and its Control in California. By R. S. Woglum and J. D. Neuls (*U.S.A. Dep. Agr., Bur. Entom., Farm. Bull.* 862, Sept. 1917; 4 figs.).—This bulletin discusses the three remedies which have been widely used—i.e. fumigation, spraying, and the artificial spread of insect enemies.

V. G. J.

Melicytus ramiflorus Forst. By S. A. Skan (*Bot. Mag.* t. 8763; 1918).—Violaceae. Native of New Zealand and Polynesia. A shrub of considerable size for the temperate house. The leaves are 2 to 6 inches long, oblong-lanceolate with a serrate margin, polished dark green above, paler beneath. The flowers are inconspicuous, born in axillary clusters and pale yellowish-green in colour. The fruit is a violet-blue, depressed globose berry $\frac{1}{4}$ to $\frac{1}{2}$ inch across.—L. C. E.

Mesembryanthemum edule Linn. By R. A. Rolfe (*Bot. Mag.* t. 8783; 1918).—Native of South Africa. A handsome succulent which requires the protection of a greenhouse in winter. It grows best when planted along the top of a low wall and allowed to hang down; a poor sandy soil suits it best and it can be propagated by cuttings taken at any time of the year. The flowers are about 3 inches across, yellow when first open, changing later to flesh colour.

L. C. E.

Mesembryanthemum Elishae N. E. Br. By R. A. Rolfe (*Bot. Mag.* t. 8776 b; 1918).—Native of South Africa. A member of the section 'Cordiformia,' in which the leaves are very fleshy and somewhat elongated, more or less united at the base but free above. The leaves are glaucous green, with scattered darker dots. The flowers are bright yellow, $\frac{3}{4}$ inch across.—L. C. E.

Mesembryanthemum fulvipes N. E. Br. By R. A. Rolfe (*Bot. Mag.* 8776a, 1918).—Native of South Africa. A member of the 'Sphaeroidea' section of the genus, in which the leaves are reduced to a single pair, united to form a globose mass termed a 'corpusculum.' Flowers about an inch across, yellow tipped with orange.—L. C. E.

Monadenium erubescens N. E. Brown. By O. Stapf (*Bot. Mag.* t. 8756; 1918).—Euphorbiaceae. Native of East Africa. A plant which grows well in a warm succulent house, under the treatment suitable for species of *Stapelia*. It has a perennial globose tuber 8 to 14 inches in diameter. One to two stems are produced from each tuber bearing rather fleshy leaves, green above, reddish with green veins beneath. The inflorescence is reduced to a solitary drooping cyathium surrounded by involucre bracts. The bracts are united to the middle to form a bell-shaped cup, white, finely veined with green, tinged with rose towards the base. Cyathium pale green cleft on one side to the middle, surrounded by a thick yellow annular gland. The male flowers are naked mixed with fimbriate bracteoles, female flower drooping exserted from the cleft of the cyathium.—L. C. E.

Mosquito Larvæ, The Effects of Petroleum Oils on. By S. B. Freeborn and R. F. Attsatt (*Jour. Econ. Entom.* vol. xi, June 1918, pp. 299-308).—The authors enumerate six theories, including their own, which have been advanced in explanation of the lethal effect of petroleum oils on mosquito larvæ. The experiments are arranged and tend to prove the contention that it is the oil vapour from the inspired oil through its extremely rapid penetration of the tracheal tissues that is mainly responsible for the lethal action. The work was originally undertaken to check the recommendation of the entomological division of the University of California, of a mixture of crude oil and kerosine in equal proportions as the best for oiling (Baumé 28° to 32°).

The conclusions reached are: The toxicity of the petroleum oils as mosquito larvicides increases with an increase in volatility. The volatile constituents are responsible for the primary lethal effects, by penetration of the tracheal tissue. In the heaviest oils (boiling point greater than 250° C.) this action may be secondary to the purely mechanical suffocation by the plugging of the tracheæ. The paper concludes with a bibliography.—G. W. G.

Mushroom Pests and how to control them. By C. H. Popenoe (*U.S.A. Dep. Agr., Bur. Entom., Farm. Bull.* 789, Feb. 1917; 7 figs.).—The insect pests that usually attack cultivated mushrooms are mushroom maggots (the larvæ of small, gnat-like flies), mites, spring-tails, and sow-bugs or woodlice. All windows and ventilators of mushroom houses should be covered with fine wire gauze, which prevents the entrance of the fungus gnats.

Mushroom spawn should only be purchased from reliable dealers.—V. G. J.

Mustard, Wild, Control of. By O. W. Newman (*U.S.A. Dep. Agr., California State Commission of Horticulture*, vol. vi., No. 6, June 1917; 27 figs.).—The author states that many noxious weeds, especially the wild mustards, including *Brassica campestris*, *B. arvensis*, and *B. nigra*, can be largely controlled by the use of chemical sprays.

The spray most commonly used is a solution of iron sulphate, and it has in every instance proved satisfactory. The usual strength is two to one—i.e. 100 lb. of iron sulphate to 50 gallons of water. This should be applied to the growing weeds when they are about 6 inches high; the spray should be medium fine and penetrating; 50 gallons should cover one acre.—V. G. J.

Odontochilus lanceolatus Benth. By R. A. Rolfe (*Bot. Mag.* t. 8753; 1918).—Native of Sikkim and Khasia. An interesting terrestrial orchid originally described by Lindley as *Anoetochilus lanceolatus*. The plant is from 8 to 12 inches in height, and the leaves are green with three bright stripes. The flowers are light green with a brown patch at the top of the dorsal petal; the lip is bright yellow, and the anther pink. It is a plant which thrives well in a damp and shady intermediate house.—L. C. E.

Odontoglossum praevisum Rolfe (*Bot. Mag.* t. 8780; 1918).—Native of Colombia. A hybrid between *O. gloriosum* and *O. Lindleyanum*. The flowers are borne in a many-flowered panicle 12 to 16 inches long, medium-sized, yellow with brown blotches.—L. C. E.

Orchard Bark Beetles and Pinhole Borers, and how to control them. By Fred. E. Brookes (*U.S.A. Dep. Agr., Bur. Entom., Farm. Bull.* 763, Nov. 1916; 18 figs.).—This bulletin gives a brief account of the principal bark beetles and related species that attack apple, peach, plum, and other orchard trees, and describes the methods most effective in controlling them.—V. G. J.

Paeonia peregrina Mill. By O. Stapf (*Bot. Mag.* t. 8742; 1918).—Native of South-eastern Europe and North-western Asia Minor. A natural species of Paeony which has been cultivated in certain parts of Europe as far back as the sixteenth century. It is a good plant for the herbaceous border and is sometimes grown under the name of 'Sunbeam.' The flowers are 2½-4 in. across, a brilliant deep red in colour.—L. C. E.

Petunia integrifolia Hort. By S. A. Skan (*Bot. Mag.* t. 8749; 1918).—Native of South America. A good species for summer bedding or conservatory decoration, better known in gardens as *P. violacea*. The flowers are at first bright rose-purple, afterwards becoming paler, outside pale rose-purple with the tube outside suffused with purple and marked with deeper purple lines.
L. C. E.

Poisonous Urticating Spines of Hemileuca oliviae Larvae, Notes on the. By D. J. Caffrey (*Jour. Econ. Entom.* vol. xi, August 1918, pp. 363-367).—It has been found that as in the case of the Brown-tail moth serious inconvenience is caused by the spines with which this species is covered. Susceptible persons may have an extremely unpleasant time by even walking through infested grass and brushing against the larval spines. In extreme cases a hand or foot may be put out of action for a time; and it has been observed that cattle avoid grazing upon infested grass. Further, something approaching asthma has been produced amongst many working on the investigations by the small spines in the atmosphere entering the bronchial tubes, and it is even suggested that it may be necessary to transfer these individuals to another part of the country to effect a cure. The urticating spines are found on several species of *Hemileuca* in addition to *H. oliviae*.—G. W. G.

Polystachya Pobeguini Rolfe (*Bot. Mag.* t. 8772; 1918).—Orchidaceae. Native of Tropical Africa. A plant for the tropical orchid house, thriving well in a mixture of peat fibre and sphagnum. The flowers are borne in a many-flowered raceme, the flowers themselves are medium-sized, bright rose, with a yellow crest on the lip.—L. C. E.

Potato Culture in Maine. By E. L. Newdick (*U.S.A. Dep. Agr.*, vol. xvii, March 1918, No. 1; 1 fig.).—This bulletin gives a very detailed account of potato culture as practised in Maine, and contains combined formulæ for "bugs" and blights.—V. G. J.

Potato-spraying Experiments. By E. S. Salmon and H. Wormwald (*Jour. Bd. Agr.* vol. xxvi. No. 1, April 1919).—An account of potato-spraying experiments conducted at the East Malling Fruit Experiment Station. Bordeaux and Burgundy mixtures were used, of two strengths, viz. (i) containing 1 p.c. copper sulphate, and (ii) 1·4 p.c. copper sulphate. 'British Queen' was the variety sprayed.

The authors summarize the results as follows:—(i) Under certain seasonal conditions one application of Bordeaux or Burgundy mixture to a second early variety of potatoes may result in loss owing to the spraying lengthening the period of ripening while not protecting the crop from attacks of blight. (ii) Under the same seasonal conditions as referred to above, two sprayings with either Bordeaux or Burgundy mixture resulted in an increase of 2½ tons and 1½ ton, respectively, of sound tubers to the acre.—G. C. G.

Potato Storage and Storage Houses. By William Stuart (*U.S.A. Dep. Agr., Farm. Bull.* 847, July 1917; 20 figs.).—Good storage is a vital factor in maintaining the vigour of seed stock. Its value is not yet properly recognized by the grower. Thorough aeration of the stored tubers and exclusion of light are essential for the best preservation of stock.

Careful investigations during several seasons have clearly demonstrated that losses in storage can be largely prevented by the proper construction and management of storage houses.

With high prices and scarcity of supply, the need of conserving the entire production for seed and food purposes is essential.—V. G. J.

Primula anisodora Balf. f. et Forr. By J. Hutchinson (*Bot. Mag.* t. 8752; 1918).—Native of Yunnan. A striking *Primula* of the Candelabra section, discovered by Mr. G. Forrest. It has proved hardy in a sheltered nook and attains a height of about 3 feet. The flowers, which are borne in a terminal umbel, are of a deep purple, almost black colour, with a yellow eye, and all parts of the plant when fresh are strongly aromatic, the odour resembling that of aniseed. The leaves are oblong-oblancoate from 6 to 8 inches long. Like many other species, *P. anisodora* dies after flowering freely, but produces an abundant supply of good seeds.—L. C. E.

Primula sinopurpurea Balf. f. By J. Hutchinson (*Bot. Mag.* t. 8777; 1918).—Native of Yunnan. A hardy *Primula* for the rock garden, growing well in half shade, and must be treated as a biennial. It is closely allied to *P. nivalis*, but differs in its more remotely repand-denticulate leaves, conspicuously farinose on the under side. The flowers are deep violet about 1½ inches across.—L. C. E.

Primula sylvicola Hort. By J. Hutchinson (*Bot. Mag.* t. 8762, 1918).—Native of Yunnan. A handsome *Primula* closely allied to *P. sino-mollis* Balf. f. et Forr., from which it differs in its much shorter corolla-tube which scarcely protrudes beyond the tips of the calyx lobes. *P. sylvicola* is too tender to be grown out of doors and does best when treated as a biennial. The flower spikes reach a height of about 2 feet and the plants remain in flower for about three months in spring. The flowers are rose-purple in colour.—L. C. E.

Pteridophyllum racemosum Sieb. By O. Stapf (*Bot. Mag.* t. 8743; 1918).—Papaveraceae. Native of Japan. A hardy perennial plant; although mainly of botanical interest, its foliage renders it quite worthy of a place in the Rock Garden. The leaves form a rosette, they are 2½–6 ins. long, unevenly pectinately pinnatisect. Plants grown in a frame keep their leaves throughout the winter, but those grown outside lose their leaves. Inflorescence racemose, flowers small, white.—L. C. E.

Radish Maggot, The. By P. J. Parrott and H. Glasgow (*U.S.A. Dep. Agr., New York Agr. Exp. Sta., Bull.* 442, Nov. 1917; 8 plates, 2 figs.).—The radish or cabbage maggot (*Phorbia brassicae* Bouché) dwarfs and destroys early cabbage; attacks seedlings of late cabbage, and causes maggoty radishes. It is a common pest, and varies in importance from year to year. During some seasons it is very destructive.

Practical measures for production of radishes that are largely exempt from insect attack are early sowing and growing of plants in frames screened with cheesecloth.—V. G. J.

Ramondia serblea Pančić. By S. A. Skan (*Bot. Mag.* t. 8765; 1918).—Native of Serbia. A pretty plant for the rock garden, bearing a close general resemblance to *R. pyrenaica*, but its flowers are not quite so large, neither is

it so robust in growth. The flowers of *R. serbica* are lilac with a yellow bearded throat; it is easily propagated by seeds and grows well in the same situations as *R. pyrenaica*.—L. C. E.

Rhododendron argyrophyllum var. **lelandrum**. By J. Hutchinson (*Bot. Mag.* t. 8767; 1918).—Native of Western Szechuan. A very hardy but slow-growing species. The leaves are green and glabrous above, covered beneath with a white mealy indumentum, everywhere except on the midrib. The flowers are rose-coloured, the corolla tubular campanulate about 1½ inches across.—L. C. E.

Rhododendron brachyanthum Franch. By J. Hutchinson (*Bot. Mag.* t. 8750; 1918).—Native of Yunnan. A neat Rhododendron discovered by Mr. G. Forrest. It is quite hardy in this country, if grown in partial shade. The calyx is large and rather leafy, flowers pale yellow, with the corolla tube wide campanulate.—L. C. E.

Rhododendron orbiculare Decne. By J. Hutchinson (*Bot. Mag.* t. 8775; 1918).—Native of Szechuan. A very distinct Rhododendron. Although quite hardy does not seem to thrive well in this country. The leaves are elliptic-orbicular, glabrous green above, glaucous and finely veined beneath. Flowers nodding, rose-carmine, corolla wide, campanulate 1½ inches across.—L. C. E.

Rhododendron oreotrephes W. W. Sm. By J. Hutchinson (*Bot. Mag.* t. 8784; 1918).—Native of Yunnan. A handsome Rhododendron discovered by Mr. G. Forrest. The most striking feature of this plant is due to the bloom on the underside of the leaves. The flowers are usually rose, sometimes flushed with lilac or lavender. It has up to the present proved quite hardy, and in its native habitat attains a height of 25 feet.—L. C. E.

Rhododendron prostratum W. W. Smith. By J. Hutchinson (*Bot. Mag.* t. 8747; 1918).—Native of Yunnan. A dwarf Rhododendron from 2 to 4 inches high, perfectly hardy in this country as far as winter cold is concerned, but it has not yet been seen whether its flowers will escape the late frosts. The flowers are borne in terminal umbels of 1 to 3 flowers; calyx large, yellowish-green; corolla very wide funnel-shaped, pinkish-violet.—L. C. E.

Rhododendron siderophyllum Franch. By J. Hutchinson (*Bot. Mag.* t. 8759; 1918).—Native of Yunnan. A species closely allied to *R. Davidsonianum*, from which plant it differs in its more densely glandular leaves, the under surface of which in consequence has a rusty and rather dirty look. Up to the present *R. siderophyllum* has proved quite hardy in this country. The flowers are rose-coloured, slightly two-lipped, with red blotches at the back of the corolla tube.
L. C. E.

Rodent Pests, The Control of. By Charles J. Sorenson (*U.S. Exp. Sta., Utah, Circ.* 29, March 1918; 2 figs.).—This circular contains directions for killing ground squirrels, pocket gophers, rabbits, and field mice. The formulae recommended for the destruction of the latter pest are:—strychnine (sulphate) 1 oz. chopped alfalfa leaves 30 lb., hot water 2 gallons; dissolve the strychnine in the hot water and sprinkle it over the alfalfa, previously moistened with water, mix thoroughly. Put the bait in small quantities, about a teaspoonful to a place, along the mouse runs and at the entrances of their burrows. Field mice are active throughout the year, and feed night and day. The above method of destruction is for winter use.—V. G. J.

Rose Leaf-hopper, Life-history and Control of the. By Leroy Childs (*U.S.A. Exp. Stn., Oregon, Bull.* 148, Feb. 1918, to figs.; 1 plate, and charts).—The Rose Leaf-hopper (*Empoia rosae*) is an apple pest, occurring in the Pacific North-west. It feeds entirely on the under surface of the leaves, causing mottling and yellowing of the foliage. It does not, as has been supposed, feed upon the fruit: 92.7 per cent. of its over-wintering eggs are deposited in the canes of the rose. There are two generations a year, and the preference of the rose as an egg depository offers a medium by which this insect can be kept under control.—V. G. J.

Scabiosa Hookeri C. B. Clarke. By J. Hutchinson (*Bot. Mag.* t. 8774; 1918).—Native of Eastern Himalaya and Western China. An attractive plant of about 1 foot in height. The leaves are 6 to 8 inches long, somewhat tufted and very hairy. The flower heads are borne singly and slightly drooping. The flowers are pale violet, with dark purple anthers. So far this species has proved to be quite hardy.—L. C. E.

Sophora japonica Linn. By W. J. Bean (*Bot. Mag.* t. 8764; 1918).—Leguminosae. Native of China. One of the most ornamental of hardy trees, flowering in September. Trees, however, do not as a rule flower until they are thirty to forty years old and seldom develop seed in this country. The leaves are deciduous, alternate, imparipinnate 6 to 10 inches long, dark glossy green above, glaucous and furnished with adpressed pubescence beneath. The flowers are borne in terminal, pyramidal panicles 4 to 8 inches high, creamy white.—*L. C. E.*

Sorrel, Red, and its Control. By F. J. Pipal (*U.S.A. Exp. Stn., Purdue, Bull.* 197, vol. xix. Dec. 1916; 15 figs.).—As a rule, an abundance of red sorrel in a field indicates acidity, insufficient organic matter, mineral plant food, or bad drainage; in other words, the soil is "sour." Any of these conditions is harmful to the development of the crops, while it does not interfere seriously with the growth of red sorrel. Consequently the latter grows and smothers the crop.

Red sorrel can be eradicated and prevented from seeding by one or more applications in form of fine spray, of 20 per cent. solution of sulphate of iron. Spreading salt liberally over infested patches will prove effective, especially in pastures.

It has been claimed that red sorrel is relished by stock. Although it is best to eradicate it as soon as practicable, it may be worth while, when found in abundance on a farm, to utilize it for feed.—*V. G. J.*

Spraying, Dusting as a Substitute for. By H. H. Whetzel and F. M. Blodgett (*Proc. 16th Ann. Meet. N.Y. Fruit Growers' Assoc.*, March 15, 1917; pp. 61-75).—A summary showing the advantages from a fungicidal point of view of dry spraying over wet, seeing that sulphur is the agent left, after lime-sulphur spraying, for combating the scab spores.

The results were disappointing, but the faults were attributed to (1) inexperience in dusting as compared with spraying, (2) the coarseness of sulphur used, (3) failure to appreciate the greatest advantage which dusting has over spraying, *i.e.* the possibility of making timely applications, and (4) the dusting machinery is much less perfected than is spraying machinery. It is urged that dusting be continued and the faults remedied, *e.g.* the sulphur to be ground finer, timeliness of application studied, and that manufacturers improve the machines, especially the feed control and distributing tube.—*G. F. W.*

Stewartia serrata Maxim. By W. J. Bean (*Bot. Mag.* t. 8771; 1918).—Ternstroemiaceae. A small hardy tree, probably native of Japan. The leaves are deciduous, elliptic or obovate with the margin serrate and teeth incurved, dull dark-green and glabrous above, paler beneath and pilose on the midrib and in the axils of veins. The flowers are solitary in the leaf axils of young shoots 2 to 2½ inches wide, cream-coloured stained with red on the outside. In the absence of seeds it can be easily propagated by cuttings made of fairly firm wood, in July and August.—*L. C. E.*

Stewartia sinensis Rehd. et Wils. By W. J. Bean (*Bot. Mag.* t. 8778; 1918).—Ternstroemiaceae. Native of Western China. A small deciduous hardy tree. It was first distributed under the name of *S. monadelpha*, from which it differs in having much larger capsules. The leaves are usually oval, bright green on both surfaces. The flowers are solitary, white, about 2 in. wide.—*L. C. E.*

Storage Houses, Management of, for Apples. By H. J. Ramsey and S. J. Dennis (*U.S.A. Dep. Agr., Farm. Bull.* 852, June 1917; 4 figs.).—This bulletin deals with the construction and efficient management of apple stores.—*V. G. J.*

Sugar-Beet Syrup. By C. O. Townsend and H. C. Gore (*U.S.A. Dep. Agr. Farm. Bull.* 823, May 1917; 9 figs.).—Describes growing of sugar beets in the garden, and a simple process of making them into a palatable and nutritious table syrup. The beets are cut into thin slices, soaked in hot water to extract the sugar. The liquid is then boiled until the requisite thickness of syrup is obtained. Generally speaking, a bushel of well-grown roots will produce from 3 to 5 quarts of syrup.—*V. G. J.*

Strawberry, Sterility In. By W. D. Vallicau (*Jour. Agr. Res.* xii. p. 613, March 1918; plates).—An important contribution to our knowledge of sterility in strawberries. The wild American species of strawberry are mostly dioecious, but the cultivated hybrids are usually more or less hermaphrodite. High percentages of abortive pollen grains are, however, produced, though some normal functional pollen grains occur, and there is no evidence of physiological self-sterility. The development of the pollen grains has been followed and is

illustrated. The author considers the "varying rates of growth, time of microspore division, ability to increase the cytoplasm, and inability in many cases to develop normally, seem to be the outward expression of the differential ability of these new chromosome combinations to carry on cell metabolism."

F. J. C.

Symbiosis, Possible, between Legume Bacteria and Non-leguminous Plants?

By Thos. J. Burrill and Roy Hansen (*U.S.A. Exp. Stn., Illinois, Bull.* 202, pp. 111-181; 17 plates).—The authors state that the nodule bacteria studied were found to be true Schizomycetes, actively motile by means of a single polar flagellum, but the nodules of the non-Leguminosae *Ceanothus*, *Cycas*, *Ainus*, and *Myrica*, which are said to be concerned with fixation of atmospheric nitrogen, are not caused by *Pseudomonas radicicola*. The nodules of *Ceanothus* are wholly different morphologically from those of the Leguminosae. The evidence as to the dissimilarity of the nodules of *Elaeagnus* and *Podocarpus* caused by these organisms is not conclusive, nor is the proof of the fixation of nitrogen conclusive. The preliminary experiments of attempting the infection of non-Leguminosae with nodule bacteria failed.

The adaptations of the nodule bacteria are constant. Such factors as acidity or alkalinity of the medium, the use or absence of organic or inorganic substances in the medium, or the presence or absence of combined nitrogen in the medium, do not affect the virulence nor break the special adaptations.

A full bibliography is appended.—A. B.

Tobacco Beetle, The: An Important Pest in Tobacco Products. By G. A.

Runner (*U.S.A. Dep. Agr., Bull.* 737, March 1919; 16 figs., 9 tables, 14 plates).—This beetle (*Laciderma serricorne* Fab.) feeds and lives mainly in dried vegetable products, and is a most destructive pest of manufactured tobacco and tobacco products. It must not be confused with a field insect, *Epitrix parvula*, which attacks growing tobacco.

The injury caused by the tobacco beetle is very great, owing to its habit of occupying its food substance during all stages of its life. The principal damage is done during the larval stage. The presence of refuse, excrement, dust, and dead beetles renders the manufactured product unsaleable.

Cigars and pressed tobacco are injured by the insect burrowing small cylindrical tunnels, which later become filled with dust and excrement. A large portion of the interior of cigars may be destroyed without external evidence of injury to the wrapper. Injured cigars do not draw well, burn unevenly, and dust is drawn into the smoker's mouth. Among destructive agencies employed in the control of the insect are:

1. High temperature or steam (a temperature of from 125° to 140° F. continued for several hours, or 150° F. for a short time) kills all stages of the beetle.
2. Treatment by cold storage.
3. Trapping or destruction by mechanical means.
4. Fumigation with carbon-bisulphide, hydrocyanic gas, or other fumigants.
5. Sterilization of infected tobacco by means of exposure to Röntgen or X-rays.—V. G. J.

Tomato as a Farm Crop for the Canning Factory, The. By C. G. Woodbury

and H. J. Reid (*U.S.A. Exp. Stn., Purdue, Circ.* 59, March 1917; 13 figs.).—Tomatoes respond to thorough cultivation and growers should give them all possible attention. The yield may be easily reduced several tons per acre by neglecting the crop at critical times. No larger acreage should be set than can be well cultivated. This circular deals very thoroughly with all points of culture on a large scale, and gives formulæ for the control of insect and disease troubles.—V. G. J.

Vegetable Evaporation (*Bull. State Comm. Hort., California*, viii, 3, March 1919;

24 figs.).—Contains many interesting papers, including one on "The Evaporation of Vegetables." Experiments by biological chemists show that all green vegetables contain a substance they call vitamen, which is necessary to the growth of young animals and children. It is thought that drying the vegetables does not destroy this compound. The weight of evaporated vegetables is $\frac{1}{3}$ to $\frac{2}{3}$ that of canned vegetables, and the process is much cheaper. They are easily prepared, and keep well if stored in tins or air-tight cases.—V. G. J.

Weeds, Whitlow Peppermint, and Black Mustard, Control of. By R. Robson, M.Sc. (*Jour. Bd. Agr.* vol. xxvi. No. 1, April 1919).—A descriptive and illustrated article on the two above-mentioned weeds, Whitlow Peppermint

(*Lepidium Draba*) is said to have been introduced into Thanet in 1809, and has since spread over Kent and Essex, becoming a pest which has hitherto been difficult to eradicate, partly owing to the depth to which the rootstocks will penetrate. Some have been traced to a depth of 4 feet, and both the usual treatment for couch-grass and hand-weeding have only kept it in check. Mr. Robson has conducted experiments by which it would appear that the weed can be controlled by two annual sprayings, about May, with a mixture of copper sulphate and either nitrate of soda or sulphate of ammonia, when fields are being cropped with oats or other grain.

Black Mustard (*Sinapis nigra*) was controlled in the same way. Some scorching of the oats occurred, but this was only temporary. The effect of the fertilizer used in conjunction with the blue vitriol was to stimulate the growth of the grain.—G. C. G.

Wilt Disease of Okra and the Verticillium Wilt Problem. By C. W. Carpenter (*Jour. Agr. Res.* xii. pp. 529-546; March 1918; plates).—Two similar diseases of okra, caused respectively by *Fusarium vasinfectum* and *Verticillium albo-atrum* are described. Both are vascular parasites and are capable of persisting for a long time in the soil. The treatment recommended is to save seed only from healthy plants, and in extreme cases to soak seed in formalin (1 part to 240 of water) before sowing. Not only is okra attacked by *V. albo-atrum*, but also egg-plant, potato, cotton, Antirrhinum, Xanthium, Abutilon, ginseng, China aster, and black raspberry.—F. J. C.

Wireworm: Mustard-growing as a Preventive. By J. C. F. Fryer (*Gard. Chron.* Feb. 8, 1919, p. 54).—Relates success on a farm in the East of England where a first crop of Mustard on infected land has been followed by good crops. When there is no other food wireworms may attack Mustard, but they eventually die out, perhaps from starvation when it is grown as seed-crop, perhaps when ploughed in, from some injurious substance set free in the decomposition.

E. A. B.

Yield, New Place Effect in Maize. By G. N. Collins (*Jour. Agr. Res.* xii. pp. 231-243; Feb. 1918).—Hybrids made at different localities showed increased yield as a result of transferring to a new locality, the change appearing to act as a stimulus.—F. J. C.

Yields of Fruit Trees, Relation of Variability of, to Accuracy of Field Trials. By L. D. Batchelor and H. S. Reed (*Jour. Agr. Res.* xii. pp. 245-283; Feb. 1918).—The authors point out that one of the main factors in causing differences in yield of fruit trees is lack of uniformity in soil. They found that a single plot of 32 trees gave far less reliable results than four 8-tree plots scattered irregularly over an experimental area, and they recommend this standard for cultural experiments, and for rootstock, pruning, and variety experiments, twice as many plots of half as many trees. The probable error of results of various groupings of trees is given.—F. J. C.

Zanthoxylum planispinum Sieb. et Zucc. By W. J. Bean (*Bot. Mag.* t. 8754; 1918).—Rutaceae. Native of Japan. A bushy shrub of 6 to 12 feet in height, branchlets almost glabrous, armed with a pair of spines at each node. The leaves are semi-persistent or deciduous, 3 to 10 inches long, unifoliate, trifoliate, or pinnate with five leaflets. The flowers are greenish, very small and inconspicuous. The fruits are red, about $\frac{1}{4}$ inch wide and contain one shining black seed.—L. C. E.

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Telegrams "HORTENSIA SOWEST LONDON."

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Form of Recommendation for a FELLOW of the
ROYAL HORTICULTURAL SOCIETY.

To

Description

Address

Being desirous of becoming a FELLOW of the ROYAL HORTICULTURAL
SOCIETY, we whose Names are underwritten beg leave to recommend
him (her) to that honour; he (she) is desirous of subscribing *.....
pounds a year.

Proposed by.....

Seconded by.....

* Kindly enter here the word *four* or *two* or *one*.

It would be a convenience if the Candidate's Card were sent at the same
time.

Agreed on behalf of the Council, this day of 19

..... CHAIRMAN

THE ROYAL HORTICULTURAL SOCIETY

Vincent Square, Westminster, London, S.W.1

Privileges of Fellows.

- 1.—Anyone interested in Horticulture is eligible for election, and is invited to become a Fellow.
- 2.—Candidates for election are proposed by two Fellows of the Society.
- 3.—Ladies are eligible for election as Fellows of the Society.
- 4.—The Society, being incorporated by Royal Charter, the Fellows incur no personal liability whatsoever beyond the payment of their annual subscriptions.
- 5.—Forms for proposing new Fellows may be obtained from the Offices of the Society, Vincent Square, Westminster, S.W.
- 6.—If desired, the Secretary will, on receipt of a letter from a Fellow of the Society suggesting the name and address of any lady or gentleman likely to become Fellows, write and invite them to join the Society.

FELLOWS.

A Fellow subscribing Four Guineas a year (or commuting for Forty Guineas) is entitled—

- 1.—To ONE Non-transferable (personal) Pass and FIVE Transferable Tickets admitting to all the Society's Exhibitions, and to the Gardens.
- 2.—To attend and vote at all Meetings of the Society.
- 3.—To the use of the Libraries at the Society's Rooms.
- 4.—To a copy of the Society's JOURNAL, containing the Papers read at all Meetings and Conferences, Reports of trials made at the Gardens, and descriptions and illustrations of new or rare plants, &c.
- 5.—To purchase, at reduced rates, such fruit, vegetables, and cut flowers as are not required for experimental purposes.
- 6.—To a share (in proportion to the annual subscription) of such surplus or waste plants as may be available for distribution. Fellows residing beyond a radius of 35 miles from London (on the A B C Railway Guide) are entitled to a double share.
- 7.—Subject to certain fees and limitations, to obtain Analysis of Manures, Soils, &c., or advice on such subjects, by letter from the Society's Consulting Chemist, Dr. J. A. Voelcker, M.A., F.R.S.
- 8.—To have their Gardens inspected by the Society's Officer at the following fees:—One day, £3. 2s.; two days, £5. 5s.; plus all out of pocket expenses.
- 9.—To exhibit at all Shows and Meetings, and to send seeds, plants, &c., for trial at the Society's Gardens.
- 10.—To recommend any ladies or gentlemen for election as Fellows of the Society.

A Fellow subscribing Two Guineas a year (or commuting for Twenty-five Guineas) is entitled—

- 1.—To ONE Non-transferable Pass and Two Transferable Tickets.
- 2.—To the same privileges as mentioned in Nos. 2, 3, 4, 5, 6, 7, 8, 9, 10, as above.

A Fellow subscribing One Guinea a year, with an Entrance Fee of £1. 1s. (or commuting for Fifteen Guineas) is entitled—

- 1.—To ONE Transferable Ticket (in lieu of the non-transferable personal Pass), and the privileges mentioned in Nos. 2, 3, 4, 5, 6, 7, 8, 9, 10, as above.
[Bond fide Gardeners earning their living thereby, and persons living permanently abroad, are exempt from the payment of the Entrance Fee.]
N.B.—Each Transferable Ticket or Non-transferable personal pass will admit two persons to the Gardens at Wisley on any day except days on which an Exhibition or Meeting is being held, when each Ticket or Pass will admit One Person only. The Gardens are closed on Sundays, Good Friday, and Christmas Day.

ASSOCIATES.

An Associate subscribing 10s. 6d. a year is entitled—

- 1.—To ONE Non-transferable Pass, and to privileges as mentioned in Nos. 3, 4, and 9.
N.B.—Associates must be bond fide Gardeners, or employés in a Nursery, Plant or Market Garden, or Seed Establishment, and must be recommended for election by Two Fellows of the Society.

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

JANUARY 14, 1919.

Field-Marshal Lord GRENFELL in the Chair.

Fellows elected (113).—C. H. Ashley, Lt.-Col. E. Barnardiston, Miss E. Bar-
ringer, Capt. R. Billingham, F. H. Brayley, A. Brooks, Mrs. J. W. Burgess, P. J.
Burkle, E. M. Burnett, Miss M. Butcher, Mrs. A. M. Cave, Major G. F. Clarke,
W. B. Clarke, L. Cleverly, P. Cole, J. T. Collins, Miss E. F. Collins, Capt. A. H.
Coltart, J. Connell, Mrs. E. M. Cooke, H. V. Cornish, F. Cox, E. T. Davies,
Miss H. Davies, E. A. Dennis, Mrs. De Roemer, H. O. Dixon, Mrs. R. Dixon,
H. J. Drake, Miss M. K. Druce, J. J. Dudley, Dr. G. J. Eady, Lady Earle, W. H.
Ecroyd, Miss Eggers, Miss E. Elias, Miss B. K. Fell, A. G. Forbes, Miss M. Foster,
C. M. Frame, W. G. Francis, J. Glavin, Mrs. Gordon, J. F. Gough, Miss M. L.
Harland, Rev. G. H. Harries, W. J. Hatford, Sgt.-Major A. J. Haysom, Mrs. M. C.
Heath, Miss A. B. Hick, Miss P. E. Hill, E. Holden, Miss G. Hughes, Miss Hunt,
J. Huxley, W. M. Jackson, T. E. James, Lieut. W. E. James, E. Johnson, Miss
Johnson, W. H. Jones, H. M. Kershaw, Mrs. H. Klem, Miss Lambert, K. Luxford,
Rev. Prof. G. S. Lyttel, J. E. MacKenzie, C. T. Mackintosh, R. Magee, Miss M.
D. Mark, Dr. H. N. Marrett, Mrs. E. J. Marsh, T. May, Miss E. F. Moore, Mrs.
Moorhouse, T. Morrow, Miss A. Nicolson, J. W. Patterson, Miss E. B. Pitman,
E. R. Polley, H. Prentice, G. E. Pusey, F. T. Quinn, J. Rathbone, Mrs. Repard,
Miss M. D. Rice, J. D. Robertson, H. R. Roger-Smith, Miss S. Round, G. D.
Rowe, Mrs. M. Rudduck, J. T. Russell, Mrs. H. Saunders, F. Scott, Miss E. M.
Smith, G. S. Smith, Hon. Mrs. L. Soltau-Symons, B. Squire, C. Stobart, F. Streeter,
H. R. Sweet, Miss F. Tattersall, D. Thomas, E. E. Thomas, S. J. Thomas,
W. S. Towers, Miss B. Tyson, G. Underwood, H. V. Viney, G. F. S. Walters,
W. G. Walters, J. C. Watt, H. M. Weir, F. E. Weiss, S. Wright, M. E. Yonge.

Fellows resident abroad (7).—G. B. Deshmukh, R. D. Fordham, W. Handley,
A. E. Jenkins, P. V. Kerr, Capt. P. Sarda, F. G. Storrs.

Associates (7).—Miss E. M. Barton, Miss E. Eagle-Bott, Miss E. C. Nicolls,
Miss M. Partridge, E. H. Pearce, C. Twiner, Miss W. Warburg.

Societies affiliated (11).—Accrington and District Horticultural Society,
Brighton Equitable Land Workers' Association, Codicote Horticultural Im-
provement Society, Cowling Horticultural Food Producing Association, Darnall
Horticultural and Floral Society, Disley Allotment Holders' Amateur Gardeners'
Association, Gwennap Co-operative Gardeners' Society, Lewisham and District
Horticultural Society, Longridge Horticultural Society, Porth and District
Amateur Allotment Association, Wadsley Allotment Society.

GENERAL MEETING.

JANUARY 28, 1919.

Capt. A. W. HILL, M.A., in the Chair.

Fellows elected (23).—J. D. Bailie, H. Baker, Miss E. Beck, Mrs. G. Beetham,
G. H. Boulter, Mrs. E. G. Brown, Miss A. Burton, Miss H. Chamberlain, F.
Clarke, E. C. Colchester, Mrs. A. B. Cooper, Mrs. M. A. Cradock, Miss M. Cunning-
ham, F. V. Darbishire, W. H. Davies, R. M. Dillwyn, Col. F. Dugdale, Miss
Edmiston, Miss E. Farquharson, W. Freire-Marreco, R. Fyfe, P. W. Greenaway,

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D. G. Gunnell, L. T. Hale, G. G. Hardaker, B. Harland, A. W. Hawkes, B. Hedger, T. W. Herbert, C. S. Hunting, Miss B. Johnson, Miss P. Jones, F. P. Lane, Mrs. H. Longhurst, E. M. Mackay, M. McNaughton, T. P. Martin, H. J. Naish, R. S. Patterson, Mrs. G. Percy, H. Price, W. T. Raine, E. Robyns-Owen, C. P. Russell, E. H. Sams, Mrs. F. M. Saunders, H. F. Smith, G. W. Stacey, Mrs. A. E. Steeves, E. Stephenson, Mrs. A. B. Thicknesse, A. A. Tindall, Miss Trevor, J. H. Turner, K. G. R. Vaizey, J. D. Watson, Mrs. R. Wingfield.

Fellows resident abroad (1).—H. A. Gordon.

Associates (4).—Miss H. C. Fry, Miss K. Hatch, H. J. Mustchin, Miss M. Watts.

Societies affiliated (2).—Castor and Ailsworth Allotment Society, Brompton Allotment Association.

A lecture on "Pritzel's 'Index'" was given by Dr. B. D. Jackson (see p. 14).

ANNUAL GENERAL MEETING.

FEBRUARY 11, 1919.

Lt.-Col. Sir ALBERT K. ROLLIT, K.B., LL.D., V.M.H., in the Chair.

Fellows elected (70).—Lady Agnew, Miss M. B. Amos, Miss R. Attenborough, Mrs. W. Baird, L. F. Barton, A. W. Bickerton, R. Bleakley, G. H. Blount, R. Bowler, A. J. Brice, C. R. Brittain, V. E. Broad, K. St. G. Cartwright, H. R. Collins, S. G. Cuthbert, C. Dalby, R. Davies, Mrs. H. Drewitt, F. W. Durrant, A. H. Dykes, J. E. Elliott, E. S. Enock, R. Fisher, B. T. Fletcher, H. W. Francis, Mrs. E. H. Graham, F. H. Hancock, E. C. Harvey, C. W. Harris, Mrs. M. Hayes-Sadler, Miss H. Heale, Mrs. C. O. Henriques, F. A. Heron, R. Hicks, G. R. Hill, H. J. Hindson, Lady Hughes-Hunter, Mrs. E. F. Jackson, E. Jones, R. Johnston, Miss B. Josephy, A. J. Kidd, Mrs. E. Knapp-Fisher, R. A. Knight, A. H. Laurence, C. G. Lockwood, F. A. Lowell, Mrs. J. I. Lowles, J. Manrique, Mrs. F. M. Moy, Jesse Pye, Mrs. A. M. Robertson, J. N. R. Rodger, Miss M. E. Roper, Lady Sebright, G. H. Short, L. E. Smith, J. W. Spackman, Mrs. A. C. Stephens, Mrs. Sturges, Mrs. G. H. Thomas, Mrs. D. C. Trier, T. Trollope, H. Wakeford, T. Walsh, H. C. Wilcox, J. B. W. Wilkinson, Miss M. T. Willis, D. Wilson, G. Wilson.

Fellows resident abroad (1).—Bashir Ahmad, India.

Associates (9).—E. O. Barton, J. Coleman, Miss M. Jones, Miss M. Major, Miss M. Marston, Miss M. A. Regensburg, Miss P. M. Ruck, M. Takagi, Miss M. Youatt.

Societies affiliated (12).—Adlington Horticultural Society, Bradford and District Federation Allotment Association, Castleton and District Young Men's Friendly Society, Cheriton and District Gardeners' Society, Creigiau and District Horticultural Society, East Grinstead Allotment Association, Liddington Food Production Society, Lyne Club Flower, Fruit and Vegetable Society, Needham Market Horticultural Society, Newbury and District Gardeners' Mutual Improvement Society, Potters Bar and Northam Cottage Horticultural Society, Redmarley and District Horticultural Society.

The CHAIRMAN, Lt.-Col. Sir Albert K. Rollit, after putting the proposals of new Fellows to the vote, said that the number was satisfactory, but, having regard to the great work the Society was doing, much of it of the very highest national importance, especially in matters of reconstruction and trade essential to horticultural development and progress, the recruitment of the Society's membership had become a matter of the most vital and urgent necessity; and the Council trusted that every Fellow would lend them the most active assistance by proposing as many Fellows as possible, and that without delay. In this the Council claimed, and relied upon, the efforts of every Fellow and the collective effort of the whole body of Fellows. Would they not pledge themselves, and urge those absent, to join this Membership-Campaign on behalf of their great Society?

Sir Albert proceeded: The Report is one of the best, if not the best, it has ever been in the power of the Council to present, of which I have the assurance of our most able Secretary, the Rev. Mr. Wilks, who is never guilty of even a clerical error. (Laughter.) It has been said that Religion must be divine for it has even survived the Theologians, and I may add that Mr. Wilks has divinely survived all his hard work for the Society during so many years of the hardest and best service. He is our St. George—and I had nearly added: when critical, our (snap)-Dragon. (Laughter.) The Report records enthusiastic, per-

sistent, and patient effort, and marks, both by facts and figures, the great progress of the Society in all its many departments, and especially in relation to its War Service, which has been strenuous and continuous in daily work, in Publications, in Literature, in Lectures, and in the provision of Funds and Plants and Seeds for Allotments and other patriotic purposes.

The Society's War Relief Fund has, indeed, made very great progress during the year, thanks to its zealous Executive Committee, representative of the whole Kingdom, as I know from being a member of it, who has seen the good work of its President, Lady Northcote, C.S.I., its Chairman, Sir Harry Veitch, V.M.H., and the many Ladies and Gentlemen who have given their services, and its Secretaries, Mr. Howe and Mr. Henschell, C.C.; and I can also realize the value and present need of our campaign, in which about £30,000 has already been collected, in order to aid in the restoration of the ravaged lands of our Allies: France, Belgium, Italy, Roumania, and Serbia; while my personal knowledge as a traveller in all those devastated countries, and of their industrious peasantry, enables me to testify to the vast help which has been and will thus be rendered to their peoples by the free gift of the best and most carefully selected Trees, Plants, and Seeds and the means and knowledge for restoring cultivation and re-afforestation.

Again, the seeds and bulbs sent by the Society to our own fellow-countrymen, prisoners in Germany, and to camps and hospitals in France and along the Mediterranean sea-board, have also given very great help, hope, and happiness to the brave but distressed sufferers. What our gifts to the British prisoners in Germany have meant in food, in joy, in hope, in sympathy, and in consolation stands out in the photographs we have recently received from Ruhleben and other prisons of our own poor captives!

The Rev. George Henslow, M.A., F.R.S., V.M.H., the Society's Professor of Botany, who has for many years been associated with the Society, and to whose Lectures we are all so greatly indebted for instruction in the marvels of plant-life and growth, has, to our great regret, recently retired, and the Fellows will be glad to know that Dr. Rendle, F.R.S., V.M.H., of the Natural History Museum, South Kensington, has been appointed to the Society's Botanical Professorship. (Applause.)

With Peace, there is every promise that the Society's National Diploma Examinations will now fulfil their full educational purpose. The War years have resulted in some reduction in the number of candidates; but there is every indication of a great revival of this most important National Examination, conducted by the Society.

The Society's Examinations have, indeed, become of increasing importance and are more and more widely resorted to in both the individual and national interests; and the recent setting up of a Board of Examiners, possessing both scientific and practical knowledge and experience, will go far to win the confidence of candidates and of Educational and Municipal Authorities, for whom I can thus speak as having been Mayor of Hull and Chairman of its Botanic Gardens, and for long President of the Municipal Corporations' Association of the Kingdom. Particular attention has been given to the Teachers' Examinations, for instruction in Horticulture in Schools is becoming so important that, in response to Educational requests, an Honours Examination for Teachers has also been set up; while actual practical, no less than scientific and theoretic, knowledge and work is now taking an essential part in the Teachers' Examinations.

Such really high educational work by the Society enabled me to induce my colleagues on the Senate of the University of London to raise Horticultural Studies and Research to University rank, by instituting Science Degrees in Horticulture (B.Sc. Hort., M.Sc. Hort., D.Sc. Hort.), for which there are already several candidates; and the Horticultural Education Committee of the Senate, of which I am Chairman, has also presented a Report, urging the University to increase the scope and utility of its Horticultural Teaching and Examinations through its University-Extension System, in both Rural and Urban Districts, and by Lectures and Teaching throughout the Kingdom, all which have been made possible by the pioneer educational work of our Society. The Society's series of Horticultural Charts, illustrating processes and pests in garden-cultivation, have proved a difficult item of new work; but, from the specimen Charts you see here, hanging on these walls, you will appreciate the class of work which is being done, and I think they sufficiently indicate their value; and, when the series is complete, a very good and necessary work will have been accomplished, and one which cannot fail to advance educational development and progress.

Our Lindley Library Committee keep clearly before their minds the duty committed to them by the Council when our new Library Trust was formed a few years ago; and no opportunity has been lost of acquiring valuable books—books which are not luxuries to be taxed but necessities to be read; which

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are Living Universities of the dead, legacies of the great dead of all ages to the living, and friends which never alter or forsake. The revision of "Pritzel" is one of the most exacting works the Society has ever undertaken, and it will certainly be one of the most enduring services to Science which it has ever been our privilege to render. The Librarian is present in this room, with the old edition, in order to show it to anyone, and he will be pleased to explain its scope, the method of reference to its plates, and the like. A great debt of gratitude is due to Sir DAVID PRAIN, Captain HILL, of our Council, and their staff at Kew Gardens for the assistance they are so ungrudgingly rendering, as also to Dr. DAYDON JACKSON, Dr. RENDLE, Mr. BOWLES, and other members of the Committee. The Fellows are urged to take seriously this task, which the Society has set itself on scientific and public grounds, and to give it such financial assistance as lies in their power; for, if the new issue is to be sold at a sufficiently low price to place it within reasonable reach of the many, a large sum must be forthcoming in donations to reduce the cost of the publication. As a result of the Council's letter of appeal, about £500 has already been received, including £100 from Lady Dilke, who has sent a cheque in order that the memory of her late husband, a personal and parliamentary friend of mine, may thus be perpetuated and associated with this important work of Botanical and Horticultural reference.

The work at Wisley, in the beautiful Surrey Highlands and Pinewoods, the County of Commons, the Shire of open spaces, continues to hold the attention and confidence of the Horticultural community. The careful and observant Cultivation, Research and Scientific work going on there in our Gardens and Laboratory, and the valuable Trials which are being made, have attracted much attention, e.g. this last year the trials of Climbing Beans caused even some sensation in the Horticultural world. Now that the War is over, the area of our Wisley Gardens is being enlarged, and the Staff is being strengthened by the appointment of qualified scientific and practical teachers and assistants in our Wisley School of Horticulture—which ought to have become a College of the University of London—as rapidly as financial means will permit. Dr. Darbishire is already working on analyses to determine the food and dietetic values of the different varieties of vegetables.

A new departure in the work of the Society, and one which indicates the confidence which it has won in the Provinces, is the establishment, under our Society's direction, of Trial Experimental Demonstration Plots in Birmingham and Manchester by their Municipal Corporations. There is no doubt that these Plots will become of great educational assistance to the thousands of people who are now devoting their leisure to growing vegetables on Allotments and small Holdings, and to *petite culture*, occupations which conduce to the health, and so to the strength, wealth, and welfare of the people, and which can never be *infra dig.* (Laughter.) The old Greek Fabulist told of men digging to find gold, but who found their reward not in gold but in golden crops, worth more than gold to footless peoples, a fable which has found its application amid the wars of our own time. For the Report also records the important work done in helping to bring about increased home-production of fruit and vegetables, the value and influences of which can hardly be fully estimated. More than ever we realize that the ruthless spoiler, be he William the Conqueror, or William the Hohenzollern, in his boast that where his war-horse plants his hoof the grass never grows green again, is the Enemy, and he who makes two blades of grass grow where only one grew before is the Saviour, of mankind. (Applause.)

Moreover, it must be very gratifying to the Fellows to know that the practical powers and position of their Society are such that it was at once called upon by the Food Production Department of the Government to assist the Ministry in the work which it took up in 1916, and from that time onward a very close and organized co-operation has existed between our Society and that Department of the Government. The Report also outlines the various ramifications of our Food-Production work, and I particularize the enormous amount of labour done by the Society's Panel of Expert Gardeners and by the Lectures and instruction given by them throughout the country.

With regard to the future of Allotments and the attitude of the Society towards their patriotic cultivators, I may say that anything the Society can do in the future it will do, to help this excellent movement to continue and prosper; and I venture to express a hope that the new Parliament may be able to provide that in future every man who is willing to cultivate an allotment garden may well be helped to do so to the best advantage. A King of France uttered the pious prayer that every Frenchman should always have a fowl in his pot. This aspiration was not realized, but a cottager's own well-directed labour may ensure both wholesome food and a healthful diet.

Our "Book of Arrangements" will have raised hopes that the Chelsea Exhibition Meeting, a very popular "Annual" of the Society, will be arranged, and I have now the great pleasure to tell you that this will take place on May 20, 21, and 22.

It has been thought best not to attempt the Summer Meeting at Holland House this year. There are certain Military difficulties still in the way; and, moreover, it would follow too quickly on a Floral Fête which is to be held at Chelsea on June 24, 25, and 26 by the Committee of our War Relief Fund, to which it is hoped that Fellows will give their most cordial support by their own presence and that of all their friends.

When the Society's Hall will be released by the War Office from Military occupation and again made available for our own use is still uncertain; but it may be confidently hoped that this will be so in ample time for the Society's Meetings in 1920, and that the Society's patriotic self-sacrifice, throughout the War, will have then achieved its purpose—help to Victory and Peace.

Fellows will be interested in a correspondence which has passed between our Secretary and Professor FAIRCHILD, of the United States Department of Agriculture, in which the latter complementarily refers to the far-reaching and most valuable influence of your Society.

It will be remembered that at the last Annual Meeting a resolution was carried by the Fellows that an effort should be made by the Council to obtain from the Food-Controller for Home Growers of Fruit sufficient sugar for the preserving of their crops. This resolution I strongly supported on the strictly economic ground that the result would benefit not only such private growers, but the whole community, by encouraging land cultivation and food production, and by withdrawing such growers from competitive purchasing of jams in the open market, thereby leaving more fruit—which is not only a food but a most necessary and wholesome diet—for general buyers. The Council at once appointed a Deputation, which I had the honour to introduce to Lord BLEDISLOE, the Chairman of the Sugar-Control Department, who, convinced by the arguments addressed to him, made the provision asked of him, and thus preserved the crops, especially the exceptionally large one of Blackberries, and so enriched many a household, and established a precedent which we quite hope to induce His Lordship to follow again this season, in the national interest no less than in that of our Fellows, for whom we shall again attend and argue by a similar Deputation. Then, may we again be able to say: "Jam satis!"* (Laughter.)

I now welcome the presence among us to-day of a very representative French Horticulturist in M. Truffaut, of Versailles, whom we shall be glad to hear, and I assure through him, as myself an Officer of the Legion of Honour of France and an active advocate of L'Entente Cordiale, as well as for many years a French Citizen, and a Juror at the Floral and Fruit Exhibitions in Paris, at the Cour La Reine, our most cordial sentiments of friendship with France and with Frenchmen. (Loud applause.)

Finally, it is my very pleasant privilege to award two of the Society's Medals. There is, happily, only one vacancy in our Roll of the Victoria Medal of Honour (V.M.H.) this year, and that Gold Medal has been bestowed by the Council upon Sir FRANK CRISP, Bt., whom all our V.M.H.s and myself will welcome as a colleague and as a notable collector of Alpine and Rock plants in his Henley garden.

The Lawrence Medal has been awarded to Messrs. SUTTON & SONS for the excellent quality and great educational value of their wonderful exhibits of summer-sown vegetables. If ever a Medal was well deserved it is this one, for Messrs. Sutton are not merely constant exhibitors at our Meetings, but their exhibits are always of the very first quality.

Now, I have to move formally from the Chair, on behalf of the Council of the Society, the adoption of our Annual Report and Accounts, and, in doing so, it is both my desire and my duty to pay the highest tribute to that most "Admirable Crichton," our Secretary, the Rev. Mr. Wilks, and his assistant, Mr. Gaskell, and also to Mr. Chittenden, Mr. Wright, Mr. Reader, and our Staffs both in London and at Wisley, who are too numerous to name individually, but who have not only surmounted immense and innumerable difficulties during the War, but have also made possible and prosperous the great services of the Society for its Fellows and for the Nation, for no work has been of greater national importance and utility. (Applause.)

The adoption of the Report was seconded by Sir John Llewelyn, Bart., who remarked upon its excellence and the vast amount of work it represented

* The Deputation has since attended, and even a more liberal allowance of sugar has been made for the coming fruit season.

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as having been accomplished by the Society. The Report was then carried amid applause.

Monsieur TRUFFAUT, of Versailles, of the French Agricultural Commission, spoke on the work done in the planting of vegetables in the Army camps behind the lines in Northern France, and reported that several thousand fruit trees, which had been planted early in 1918, had been uprooted and carried to Germany after the German advance in the spring of last year.

In the absence of the Treasurer through illness the Auditor explained the position of the Society's finances.

On the proposal of Mr. C. G. A. Nix, seconded by Captain A. W. Hill, the accounts were adopted.

The following names of President, Vice-Presidents, Members of the Council, and Officers, having been duly proposed and seconded, and the list circulated in accordance with Bye-law 74, and no other names having been proposed, they were declared by the Chairman as elected:

<i>As President.</i>	<i>Proposed by</i>	<i>Seconded by</i>
Field-Marshal the Right Hon. Lord Grenfell, G.C.B., G.C.M.G.	The Rt. Hon. Lord Balfour of Burleigh, K.T., G.C.M.G.	Mr. Henry B. May, V.M.H.
<i>As Treasurer.</i>		
Sir Harry J. Veitch, V.M.H.	Lt.-Col. Sir Albert K. Rollit, D.C.L., LL.D., Litt.D., V.M.H.	Mr. F. J. Hanbury, F.L.S.
<i>As Secretary.</i>		
The Rev. W. Wilks, M.A., V.M.H.	The Rt. Hon. Lord Balfour of Burleigh, K.T., G.C.M.G.	Mr. Henry B. May, V.M.H.
<i>As Members of Council.</i>		
Lieut.-Col. F. R. S. Balfour, M.A.	Mr. F. J. Hanbury, F.L.S.	Lt.-Col. Sir Albert K. Rollit, D.C.L., LL.D., Litt.D., V.M.H.
Field-Marshal the Right Hon. Lord Grenfell, G.C.B., G.C.M.G.	Capt. Arthur W. Hill, M.A.	Mr. Arthur W. Sutton, V.M.H.
The Right Hon. Lord Lambourne, C.V.O.	Mr. Arthur W. Sutton, V.M.H.	Capt. Arthur W. Hill, M.A.
<i>As Vice-Presidents.</i>		
The Duke of Bedford, K.G., F.R.S.	Mr. E. A. Bowles, M.A., V.M.H.	Mr. James Hudson, V.M.H.
The Right Hon. The Earl of Ducie, F.R.S.		
Sir John T. Dillwyn-Llewelyn, Bart., D.L., J.P., V.M.H.		
The Duke of Portland, K.G., P.C., G.C.V.O.		
The Right Hon. James W. Lowther, P.C.		
Sir Daniel Morris, K.C.M.G., V.M.H.		
Sir David Prain, C.M.G., F.R.S., V.M.H.		
<i>As Auditor.</i>		
Mr. Alfred C. Harper.	Mr. J. Hudson, V.M.H.	Mr. E. A. Bowles, M.A., V.M.H.

Mr. W. A. BILNEY, J.P., proposed the following amendments to the Bye-laws, which were seconded by Mr. E. A. Bowles and carried:

Resolution I.

"That the following Declaration be inserted in the Bye-laws immediately following the words 'Chapter I.' and before the word 'General.'"

(CHAPTER I.)

PRELIMINARY DECLARATION.

The Society is essentially an Educational Society in both the Practice and Science of Horticulture. For this purpose it holds frequent Meetings with the

object of gathering together specimens of plants, fruits, flowers and vegetables, etc., illustrative of the continual advance being made in Horticulture by the application of science and scientific methods to their cultivation and breeding.

Lectures are delivered at these Meetings which have generally a bearing on the illustrative specimens; the one sole object of the Meetings, the illustrative specimens, and the Lectures, being the information and instruction of all who care to attend.

(GENERAL.)

Resolution II.

"That in Bye-law 11 the words 'General Meetings and Exhibitions' be amended to read 'General and other Meetings,' and that in all Bye-laws where the words 'Exhibition,' 'Exhibitions,' 'Show' or 'Shows' occur, the words 'Meeting' or 'Meetings' be substituted. See, for example, Bye-laws 3, 22, 51, 80, and any other places where either of the words may be found."

Resolution III.

"That in order to make Bye-law 96 harmonize with Bye-law 73 the words 'twenty-one days' in Bye-law 96 be altered to read as in Bye-law 73 'fourteen days.'"

The Meeting closed with a vote of thanks to the Chairman, moved by Mr. Arthur W. Sutton, J.P., V.M.H., seconded by Mr. Bilney, J.P., and carried by acclamation, which Sir Albert Rollit, the Chairman, acknowledged.

REPORT OF THE COUNCIL FOR THE YEAR 1918.

1. **The Year 1918.**—In issuing the one hundred and fifteenth Report of the Society, the President and Council feel that they have very great cause to congratulate the Fellows, not only on the conclusion of the most terrible war which this country (or indeed any other country) has ever had the misfortune to have been forced to engage in, but also on the fact that, notwithstanding the financial strain which has fallen upon all classes of the community, the Society itself has been able to weather the storm, and even in this last year to restore, to some slight extent, its numbers, which the first year of the War had so greatly depleted.

Through the Food Production Department, the Government have made great use of the Society's experience and organization, and the President and Council have been only too glad to place themselves and their officers at the Government's disposal. This has added vastly to the work of the office, but the whole of the staff have wrought with a will to make themselves thoroughly useful in the hour of their country's necessity, and the President and Council have the satisfaction of knowing that the prestige of the Society never stood higher than it does at the present moment in every part of the Empire.

2. **R.H.S. Food Production Campaign.**—It will be remembered that the Director-General of Food Production enlisted the Society's organization and technical staff for the work of his Department when it was first set up early in 1917. Dr. F. Keeble, F.R.S., C.B.E., the Director of the Society's Gardens at Wisley, was released to take the post of Director of the Horticultural Section, and subsequently Controller of Horticulture, in the Food Production Department; whilst Mr. F. J. Chittenden, V.M.H., the Head of the Laboratory and Technical Instruction at the Gardens, Mr. S. T. Wright, the Superintendent, and other members of the Wisley Staff, have also rendered most useful services of a special nature. This work has been steadily continued during the past year with the object of increasing the fruit and vegetable production of the country.

3. **R.H.S. Panel.**—The Society's Panel of Expert Garden Advisers, which now contains 2,000 names enrolled upon it, also rendered inestimable services, the full extent of which can never be fully determined. Their periodical reports clearly indicate the influence they have exercised by the lectures, demonstrations, and instructions they have given to those who have been growing their own vegetables during the years of the War.

4. **Special Lecturers.**—Similarly the work done by the Society's Special County Representatives and Lecturers (32 in number) cannot fail to be productive of good and enduring results. After attending a ten days' Conference at the Society's Gardens at Wisley, these Lecturers were sent forth all over the country. The object of the Conference was to discuss the best methods of growing food-stuffs in gardens and allotments, and the Lecturers were thus brought to a uniform line of instruction, so that all might be teaching the same general principles and practice of cultivation. A Report made by the Society to the Director-General of Food Production on the work of the twelve months ending March 1918, showed that over 400 lectures had been delivered by them during the winter of 1917-18, and that no fewer than 39,000 people, mostly cottagers and allotment holders, had attended them.

Both this and the Panel work has involved a very large amount of labour and thrown considerable strain upon the organizing staff at Vincent Square. The work of the Special Lecturers is being continued on still wider lines during this passing inter, but the complete figures will not be available till the end of March.

The figures given in the preceding paragraphs do not include the lectures given by Mr. Chittenden, V.M.H., the Head of the Wisley Educational Department, who has been in great demand all over the country for lectures of a specially high order. His work in this direction has been very influential and has gone far to establish the pre-eminence of the Society's teaching staff. Amongst the centres at which his Courses of Lectures have been delivered

are: Nottingham University College, Birmingham University, The University of London, Gresham College, Bishopsgate Institute, Sheffield, Manchester, Norwich, etc.

A popular lecture on "Potato Growing (Spring Work)," promoted by the Society and delivered at the Mansion House on February 13, by Mr. W. Cuthbertson, J.P., V.M.H., was an unqualified success. The Right Hon. the Lord Mayor was in the chair, and the Egyptian Hall was crowded from end to end by an attentive audience. A companion lecture was given by Mr. Cuthbertson on "Summer and Autumn Work in Potato Growing," at the Caxton Hall, Westminster, on June 19, when the Rt. Hon. Lord Bledisloe (Sir Charles Bathurst) was in the chair.

To all these gentlemen—to Mr. Cuthbertson, to Mr. Chittenden, to the Special County Lecturers, and to the Members of the Society's Panel of Advisers, the President and Council desire to accord their heartiest thanks for the good work they have done and for the able manner in which they have done it and all helped to maintain the Society's prestige.

The Society's printed lectures with lantern slide illustrations, have also been most useful. They were first circulated in the autumn of 1917, and consisted of a series of 21 printed lectures and more than 100 sets of illustrative lantern slides. During the winter of 1917-18 they were utilised by no fewer than 639 Societies, and were the means of instructing upwards of 50,000 people.

Four Members of the Council, Lord Lambourne, Messrs. W. A. Bilney, A. W. Sutton, and James Hudson, have for the last three years inspected the gardens of the London Children's Garden Association, and have been greatly pleased at the evidence of diligent cultivation which the gardens displayed in most of the localities they visited.

5. R.H.S. Travelling Exhibit.—As the Society's Food Production work grew and developed, a need was felt for models, specimens, charts, etc. These were required for the many Food Production Exhibitions which have been held all over the country by Educational Authorities, Public Schools, Horticultural and Allotment Societies, Horticultural Instructors, Lecturers, and others. The work of preparing models was accordingly taken in hand, with the result that early in the year a highly instructive exhibit was available. It was first shown at the Exhibition of the Institute of Hygiene in Devonshire Street, London, and has subsequently travelled to many parts of the country in charge of the Society's Representatives, Mr. C. H. Curtis, Mr. W. H. Divers, V.M.H., Mr. W. Stewart, N. D. Hort., and Mr. C. R. Fielder. Twenty-six exhibitions, lasting from a week to a fortnight, have thus been visited, and many thousands of people have benefited thereby. The exhibit includes models of various garden operations, such as the right way of digging and trenching, the planting of potatoes, the making of a potato clamp, the testing of seeds for germination, specimens of diseases, and sixty museum cases of insects (both helpful and harmful) met with in the garden. This collection of specimens is one of the best in the country, and it has proved highly attractive. The exhibit was inspected on October 26 by the Queen at the Caxton Hall, Westminster, when Her Majesty was graciously pleased to express her appreciation of the work the Society is doing, and to wish it every success in its efforts for furthering the increased production of orchards, gardens, and allotments throughout the country.

The Society has spent over £2,500 during the year on its Food Production work, for which a grant is being given by the Treasury through the Food Production Department.

6. The Future of Allotments.—The preceding paragraphs will have shown to the Fellows what a vast amount of work the Society has done in these various directions to encourage and assist the Allotment Movement, which, during the War, has spread so happily from one end of the country to the other. The President and Council have rejoiced to see it taken up with such enthusiasm, and to hear from their County Representatives, Lecturers, and Panel, how excellent the cultivation of these allotment gardens has generally been, and what an enormous amount of vegetable food they have produced.

It remains only to say—(1) that anything the Society can do in the future, with the very limited means at its disposal, it will do, to help this excellent movement to continue and prosper; and (2) to express a hope that the new Parliament may be able to provide that in future every man who is willing

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to cultivate an allotment garden well, shall be enabled to do so. Whether the actual present allotments can in all cases be continued depends on many different considerations, but the Council are unanimous in expressing their opinion that so far as accessible land can be found, an allotment garden ought to be available for every man in this country who, having no garden attached to his dwelling, desires one; and that the provision of them ought to be made out of National Funds, and with fairness and even with generosity towards the present land-owners. The President and Council are convinced that such provision of National Allotment Gardens to all who desire them and work them well will be of inestimable value to the country at large in promoting the health, and happiness, and well-being of the community in general.

7. **Publications.**—The Society's War Publications, Pamphlets, and Leaflets have continued to be in demand. After the very heavy issue of 1917 and the first four months of 1918, it was no little relief to the office staff to know that their immediate purpose had, in the main, been accomplished, and some little falling off from the previous demand for them gave welcome relief from the heavy strain which the Publications Department had borne during the previous months.

8. **The Society's Influence.**—It is often felt that Fellows are insufficiently acquainted with the far-reaching influence of the Society. Its correspondence has, certainly for the last thirty years, been world-wide, and its *Journal* and other publications are read even in the remotest parts of the earth wherever a Botanic station or a garden of any pretension exists. In this connexion Fellows will be gratified to know that the influence of the work they have been doing through the Society for the War has not been confined to Great Britain only. Its influence has reached forth across the Atlantic to the Senate of the United States, where letters from the Society, written in 1917, were read to the Members present and called forth the following replies from Dr. David Fairchild, to whom the communications were addressed :—

" United States Department of Agriculture,

" Washington, D.C., February 19, 1918.

" DEAR MR. WILKS,—Your letter of January 11 came in the nick of time, as we say in this country.

" A Bill was being introduced in Congress for the erection of Community and Experimental Drying-plants, and I took the liberty of reading to the Senate that portion of your letter dealing with the subject of public store-houses, and the canning and drying of vegetables. The citations from your letter added weight to the arguments which I presented.

" Very sincerely yours,

" DAVID FAIRCHILD,

" Agricultural Explorer in Charge."

" Washington, D.C., July 6, 1918.

" MY DEAR MR. WILKS,—I have been so rushed with other matters that I have not shown you the courtesy of acknowledging the receipt of your very remarkable letter with regard to the situation as you see it from your point of advantage as Secretary of the Royal Horticultural Society. I have taken the liberty of using extracts from your letter in an appeal which we are sending to all those who receive regularly our bulletin. . . . Copies of this have gone out to about 250,000 people, and we are now running a second edition. It will also be published in the *National Geographic Magazine*, which has a circulation of 600,000, and extracts from it have appeared in many of the largest magazines of this country. I presume that before the season is in full swing five or six million people will have had a chance to read it.

" If you, after reading the bulletin, have any suggestions to make, they will be most keenly appreciated by us.

" Very sincerely yours,

" DAVID FAIRCHILD,

" Agricultural Explorer in Charge."

Letters of grateful appreciation from Fellows and others for the work of the Society, and the influence it exercises, are received almost daily; but when the Society is found to have influenced so important a body as the Senate of the United States, and on such an important topic, it justifies special attention and permanent record. As our American cousins have so ably assisted in

bringing the War to an end, it is good to feel that the Royal Horticultural Society of Great Britain has helped them, if only in so small a degree as this.

9. **The Lindley Library.**—The Library has been maintained in a state of efficiency, and though the number of Horticultural books put on the market during the War has not been so great as before, no opportunity has been lost of acquiring any valuable books which have been offered.

10. **Seeds for Hospitals.**—Seeds and bulbs were again sent to our fellow-countrymen prisoners in Germany, and to camps and hospitals in France and in the Mediterranean regions.

11. **Wisley Gardens.**—The work at Wisley, as in all other gardens, has been greatly handicapped by shortage of labour and the absence on special Government war-work of almost the whole of the Laboratory Staff. The difficulty has been met to some extent by the elimination of all trials of flowers for the period of the War, and by postponing all new developments in the Garden.

The vegetable trials, which are such an important feature of the Society's work, have been continued, and a number of trials of plants of possible garden value have also been made, some of them at the request of the Food Production Department of the Government. Special interest was taken in the trial of climbing beans, which has revealed the existence of several of probable value for English gardens both for use as green pods and of winter value for their dry seeds. A full report of these has appeared in the *Journal*.

Of cultural experiments made in the Garden during the past year special mention may be made of planting to ascertain the most economical method of spacing parsnips and potatoes. Tests of the value of "sludge" manures, and of organic manures as compared with chemical fertilizers, have also been made. These will be reported upon in the *Journal*. The experiments on the pruning of fruit trees are being continued, whilst many of the new crosses of vines, strawberries, and Rubi raised in the Gardens should fruit next season and show their value.

Mr. Ramsbottom, who has now taken up a new position, was able to carry out another season's work upon the eelworm disease of Narcissi, a report of which will be published in the Society's *Journal*. Mr. Ramsbottom has consented to continue this investigation till its completion.

Dr. F. V. Darbishire, M.A., has been appointed to carry out researches into the comparative composition of different varieties of the same vegetable, in order to ascertain whether one variety is of greater food value than another, as appears probable. He took up his duties in August. Mr. Ramsbottom's place has been filled by Mr. A. T. Rudge, an old student at Wisley.

The School of Horticulture has been continued throughout the War although the number of students has been small. The cessation of hostilities will probably make considerable demands upon our accommodation in this direction.

A very large number of visitors have been to the Garden during the past year, mostly seeking advice upon Food Production. The exceptional crop of apples of excellent quality in the Garden this year, due chiefly to timely spraying in the spring, has given the opportunity of arranging a comprehensive collection of varieties in the Laboratory for the information of visitors.

12. **Birmingham and Manchester Trial Plots.**—The Food Production work of the Society has undoubtedly brought it into wider relationship with the country at large. This has recently been made manifest in many ways. One of these was a request by the Birmingham Corporation for the Society to take up the direction and supervision of a series of demonstration plots for which it was prepared to provide the ground and the labour if the Society would provide the seeds of the plants to be grown, and generally direct their sowing and cultivation on similar lines to those adopted by the Society in its own Gardens. The object of the Corporation in providing these demonstration plots is that their allotment holders may work more intelligently and be better informed as to the varieties which are most likely to bring about the best results in their neighbourhood. The Council viewed the proposal favourably, and plots have now been set up and the work is in progress. The Manchester Corporation are now taking similar steps, and have asked the Society to identify itself with them on similar lines.

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13. **R.H.S. Gardening Charts.**—The growing demand from all parts of the country for instruction in gardening, and the emphasis which the new Education Act will give to the subject, throws upon the Society the responsibility for providing such authoritative material as will assist teachers and instructors in their work. One step the President and Council have already taken is to provide a series of Wall Charts illustrating garden subjects, such as insect pests, fungus pests, garden operations, fruit-growing operations, etc. These charts are now well in hand, and some have already been issued. A full list of those in preparation and of those now available can be obtained from the Secretary at the Offices, Vincent Square.

14. **Examinations.**—With the view of further encouraging and extending the general range of horticultural knowledge throughout the country, not only amongst working and professional gardeners, but also amongst horticultural instructors and teachers of all grades, the Society's Examinations have been considerably revised in the direction of making them a more practical test of horticultural knowledge and experience. A Board of Examiners has been set up (see page 43, Book of Arrangements), which first dealt with the syllabus and regulations for both the General and School Teachers' Examinations, so that not only has their standard been raised, but the practical experience and knowledge required of candidates in future will be increased. The School Teachers' Examination particularly has been revised, and now consists of both an Elementary and an Honours Examination, in both of which evidence of actual practical work will be required of all candidates. In the Honours section practical work will form an actual part of the Examination itself.

The Degrees in Horticulture of the University of London have now come into operation, inasmuch as five Candidates have entered for the Bachelor's Degree this year, a result due largely to the action of the Society and the Resolution for the conferment of such Degrees moved by Sir Albert K. Rollit, V.M.H. (a Member of Council), in the Senate of the University.

The Series of Examinations which have now been set up for workers in horticulture, ranging from the Society's Junior Examination to the Senior School Teachers', the National Diploma, and finally the University Degree in Science, represent several links in a chain which is now educationally complete.

15. **Deputations &c.**—The President and Council have kept careful watch on such various interests of Horticulture as have from time to time been affected by war conditions.

The last General Meeting of the Fellows passed unanimously the following resolution on the motion of Charles E. Shea, Esq., seconded by the Rev. G. H. Engleheart, M.A., V.M.H. :—

"That the Fellows of the 'Royal Horticultural Society,' in Annual Meeting assembled, record an emphatic protest against the decision of the Food Controller that, notwithstanding that there is an officially admitted greater quantity of sugar now in this country than was available last year, no sugar is this year to be allowed for home-made jam, or preserves, to the private growers of fruit, entailing the loss of an immense amount of valuable national food; and this Meeting further records its entire approval of the Memorandum of Protest addressed by the President and Council of the Society to the Director of Sugar Distribution on the 31st January last."

This question touched the interests of the great majority of our Fellows, and was at the same time consistent with the economic interests of the community in that it enabled private fruit-growers to save their fruit and so to have no (or less) need of buying jam in the open market in competition with the general public. Approving this resolution, the Council at once took steps to carry it out by obtaining an appointment which was readily given by Lord Bledisloe (then Sir Charles Bathurst), the Director of Sugar Supplies, who courteously listened to the Deputation which waited upon him, consisting of the Rt. Hon. Lord Lambourne, Sir Albert Rollit, and Messrs. W. A. Bilney, J. Cheal, James Hudson, C. E. Shea, A. W. Oke, W. H. Page, Owen Thomas, and the Rev. W. Wilks. The Deputation was introduced by Sir Albert, and several members addressed Sir Charles, who ultimately promised an allowance of sugar for preserving (and though, according to correspondence in the newspapers, some growers did not receive their full quantity, this, it is understood, was due to faulty distribution, for which the Department was not responsible); so that the result of the Deputation was successful and private

fruit-growers thus assisted were generally satisfied with the action of the Society and the response of the Department.

Representations have also been made to the Prime Minister on the subject of Afforestation; to the Minister of National Service on Man-power and its Application to Gardeners; to the Controller of Mines on the Provision of Fuel for Horticultural Purposes, which resulted in special consideration being given in the case of valuable stocks of plants; to the Rt. Hon. R. E. Prothero concerning Seed Potatoes; and to the Commission on the proposed Luxury Tax on the Exemption of Scientific and Educational Books from Taxation.

A Deputation from the Society was sent to the 50th Anniversary Exhibition of the Southampton Royal Horticultural Society on October 15. It consisted of Sir Daniel Morris, K.C.M.G., V.M.H., Mr. Arthur W. Sutton, V.M.H., Mr. James Hudson, V.M.H., and the Rev. W. Wilks, M.A., V.M.H. The Deputation was given a very cordial welcome, and awarded the Society's Medals at what was undoubtedly a most excellent exhibition, and one in every way worthy of that Society. The President and Council particularly wish to acknowledge the courtesy and hospitality afforded by Professor G. S. Lyttel and Mr. C. S. Fudge to the Members of the Deputation.

16. **R.H.S. Hall.**—Fellows can now look forward to reoccupying their own Hall at Vincent Square within (it is hoped) a short space of time, as the advent of Peace will liberate it from the military purpose to which it has been devoted during the last two years. How long it will actually be before the Fortnightly Meetings can again be held in the Hall it is, of course, impossible to say at the present moment; but the Council have little doubt but that the Australian Imperial Force will wish to redeem the promise given on their behalf by General Anderson when he first opened negotiations for its acquisition, namely: that it should be returned to the Society at the earliest possible moment.

17. **Pritzel Revision.**—Perhaps the most important permanent technical work done by the Society during the year is that which concerns the revision of "Pritzel." Fellows will be glad to learn that the work is now actually in hand. In last year's Report it was mentioned that two Committees had been set up for defining the extent of the work to be taken in hand, and this they have done, outlining the scope of the work and appointing the staff for seeing it through its first stages. Typists are now daily at work preparing the manuscript for the publishers. With the kind consent of Sir David Prain, C.M.G., F.R.S., V.M.H., Director of the Royal Botanic Gardens, Kew, they are working at Kew, under the personal supervision of Captain Arthur W. Hill, Assistant-Director, and a Member of the Society's Council. It is estimated that the new work will include about 250,000 references. A special communication on this subject is being issued to the Fellows with this Report, to which they are referred for further information concerning the purpose of this monumental work which the Society has undertaken, and which, as a scientific and practical record, will ever remain as a lasting evidence of the devotion of the Society to both the practice and the science of gardening. Fellows are invited to give generous financial assistance, as the work will cost at least £3,500 to produce. All the Botanic Stations, Experimental Stations, and the most important Libraries throughout the world are also being asked to assist. Subscribers of £15 15s. will receive a free copy; subscribers of fifty guineas will receive a copy bound in half-calf; subscribers of £100 will receive a copy bound in calf or in vellum, as they may prefer. It is proposed to publish the names of all subscribers of £1 1s. and upwards in the introduction of the new work, so that they may be known to those who come after as those to whom the new Pritzel is due.

18. **Trafalgar Square Fête.**—Fellows will be interested to know that the Society's Exhibition staff was lent to the British Ambulance Committee for organising and assisting at its Floral Fête held in Trafalgar Square in June. In a letter of appreciation from the Rt. Hon. Lord Beresford, G.C.B., chairman, and Mr. Bradby Peyman, the vice-chairman, acknowledging the assistance rendered by the Society, it is said that nearly £9,000 was collected. The letter goes on to say: "We fully realize that the same measure of success would not have resulted had it not been for your Council's co-operation and assistance." Special thanks are due to Mr. Bisset and Mr. Jordan in this respect.

19. **War Relief Fund.**—The Special Committee appointed to carry out this branch of the Society's work, as announced in last year's report has made

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satisfactory progress. Amongst other arrangements Lady Presidents have kindly undertaken to collect funds in the English Counties, whilst Miss Balfour is acting as Convener for Scotland and the Countess of Bessborough in the same capacity for Ireland, the Lady Northcote, C.I., being the Lady President of the General Committee. The Council tender their very sincere thanks to these ladies for the interest they are taking in the success of the movement. Consultations are being held with the Official Representatives in this country of France, Belgium, Serbia, and Rumania, with a view to ascertaining the most effective methods of dealing with the funds collected.

The Rt. Hon. the Lord Mayor of London (Sir Horace Brooks Marshall, LL.D.) very kindly occupied the chair on December 18 at a Meeting at the Mansion House in aid of the Fund, when Sir Harry Veitch, V.M.H., and the Speaker of the House of Commons (the Rt. Hon. J. W. Lowther, P.C., M.P.) eloquently advocated its claims, praising very highly the good object in view. A cordial vote of thanks to the Lord Mayor for his kindness was proposed by our President, Field-Marshal Lord Grenfell, G.C.B., G.C.M.G., seconded by the Lady Northcote, and carried with acclamation.

20. **The Future of Scientific Workers.**—It is a welcome sign of the times that gardeners are more and more seeking to advance the interest and utility of their work by accepting the help which the Science of Horticulture can afford them. Towards this point the Society has been working for many long years. It is always hard to break down the prejudice which almost everywhere exists between Practice and Science, and from which practical gardening is by no means exempt, but that this prejudice is preparing to yield is evidenced by the fact that the horticultural scientist is beginning to find a place in the Laboratories of our leading gardening firms. For this purpose the Council were glad to release Mr. J. K. Ramsbottom, one of the Society's Researchers at Wisley, for an engagement with one of our leading horticultural firms, for their scientific work. It is hoped that the day is not far distant when the Society will be in a position to provide from the Laboratory at Wisley all such scientific workers as may from time to time be required by trade firms.

21. **Council.**—The President and Council experienced a great disappointment in March, caused by the retirement of one of their most valued Members, Sir David Prain, C.M.G., F.R.S., V.M.H., the Director of Kew, for though he had been a Member of Council for little more than a twelvemonth his advice and co-operation had not only been of the greatest possible service to the Society, but he had also endeared himself personally to all the members of Council and Staff. He would greatly have liked to continue to act on the Council, but the increase of work falling on him officially at Kew made it imperative, from a medical point of view, that he should give up all external engagements. The Council were, however, greatly rejoiced when Captain Arthur Hill, M.A., Sir David's Assistant-Director at Kew consented to take his chief's place.

22. **Journal.**—The President and Council greatly regret the unavoidable delay which has attended the publication of the Society's *Journal* during the past year—delay due entirely to the threefold cause of (1) depletion of staff, (2) extreme shortage of paper, and (3) the difficulties which have attended the printing trade all over the country. It is confidently hoped that the present year may see a great improvement in all of these respects and a consequent resumption of the *Journal's* regular publication.

23. **Training of Soldiers.**—Negotiations with the Government are now in progress as to the possibility of the Society receiving discharged soldiers at the Wisley Gardens for training in Horticulture.

24. **Obituary.**—The Council have to record with deep regret the death of many Fellows, and friends of, and workers in Horticulture, amongst them the following:—The Earl of Suffolk, Lord Abinger, Lord St. Audries, Sir Ratan Tata, Sir H. Weber, the Rev. C. H. Bulmer, and Messrs. E. J. Allard, H. J. Cutbush, G. H. Davidson, J. Harrison Dick, E. Goodyear, J. Leeman, F. H. North, F. Monteith Ogilvie, R. Hooper Pearson, John Pope, T. Rochford, E. J. Stubbs (the architect of the Society's Hall), Monsieur Maurice de Vilmonn, Miss E. C. Talbot, and Miss Ethel Sargent.

25. **V.M.H. and Lawrence Medal.**—There being only one vacancy in the Roll of the Victoria Medal of Honour, the Council have had very great pleasure

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in nominating Sir Frank Crisp, Baronet, a gentleman who has done so much for Horticulture in general and especially in his wonderful collection of Alpine and Rock Plants.

The Lawrence Medal for 1918 the Council have awarded to Messrs. Sutton & Sons for the excellent quality and great educational value of their frequent and really wonderful exhibits of summer-sown vegetables.

26. **Numerical Position.**—The following table shows the Society's position with regard to numerical strength during the past year:—

LOSS BY DEATH IN 1918.				FELLOWS ELECTED IN 1918.			
		£	s. d.			£	s. d.
Life Fellows	3	0	0 0	4 Guineas	7	29	8 0
4 Guineas	1	4	4 0	2 "	220	462	0 0
2 "	55	115	10 0	1 "	703	738	3 0
1 "	50	58	16 0	Associates	16	8	8 0
Associate	0	0	0 0	Affiliated Societies	195	214	4 0
				Commutations	5		
	115	£178	10 0	= £101 15s. 0d.			
LOSS BY RESIGNATION, &c.				Loss.	1146	£1,452	3 0
						540	15 0
				NET INCREASE IN INCOME			
4 Guineas	0	0	0 0			£911	8 0
2 "	117	245	14 0	Deaths and Resignations			345
1 "	106	111	6 0	New Fellows			1,146
Associates	6	3	3 0				
Affiliated Societies	1	2	2 0	NUMERICAL INCREASE			
	230	£362	5 0				801
TOTAL LOSS	345	£540	15 0	Total on December 31, 1917		13,831	
				Total on December 31, 1918		14,632	

27.—**Committees, &c.**—Even more than in any recent years are the thanks of the Society due to the members of the Standing Committees and to the Lecturers and Judges who have had to work in the darker, colder, and less convenient quarters of the Drill Hall instead of in our own premises. The Council are confident, however, that these unavoidable inconveniences have been gladly borne in order that our own building might be used for the benefit of our Australian kinsmen who have wrought so nobly in defence of the Empire all through the War.

Thanks are also due to all those who have done such good service on Special Committees, or as Examiners, Compilers of Extracts, Reviewers, and Writers of Papers for the *Journal*, contributing thereby to the Society's national usefulness, and helping to maintain its high standing among the practical and scientific institutions of the world.

The Council also wish to thank Captain Scott and the Staff of the London Scottish for the invariable courtesy and consideration the Society has received at their hands.

Last, but not least, the Council desire cordially to acknowledge their obligations to their own Staff, who have been working under exceptionally difficult conditions; and also to the Press for their invaluable assistance in reporting, and calling attention to, the work of the Society.

By Order of the Council,
W. WILKS,
Secretary.

ROYAL HORTICULTURAL SOCIETY,
VINCENT SQUARE, WESTMINSTER, S.W.
January 1, 1919.

Dr. **ANNUAL REVENUE & EXPENDITURE ACCOUNT**

	£	s.	d.	£	s.	d.
To ESTABLISHMENT EXPENSES—						
Ground Rent	690	0	0			
Rates and Taxes	623	13	6			
Water Rate	24	4	4			
Electric Light	18	7	4			
Gas	31	10	7			
				1,387	15	9
Salaries and Wages	£2,259	17	2			
Bonuses	527	15	0			
				2,787	12	2
Printing and Stationery	1,548	3	11			
Publications	1,540	3	11			
Postages	580	1	4			
Fuel	19	6	10			
Professional Fees	203	3	0			
Gratuities	46	0	0			
Repairs and Renewals (including £150 for Hall Painting)	215	3	9			
Miscellaneous Expenses	173	9	4			
				7,113	4	3
„ INSURANCES				176	18	0
„ JOURNAL, PRINTING AND POSTAGE				2,232	10	6
„ STAFF PENSION	257	0	0			
Less contributed by the Staff, as per scheme	110	6	6			
				146	13	6
„ MEETINGS—						
Autumn Fruit and Vegetable Meeting	221	10	3			
Labour, Floral Meetings and Conferences	274	0	4			
Expenses, do. do.	86	18	7			
Council, Committee and Deputation Expenses	192	10	11			
Painting Orchid Certificates	30	10	6			
				805	10	7
„ INSPECTION OF GARDENS				199	6	3
„ PRIZES and MEDALS—						
Awarded at Society's Meetings				211	18	10
„ CONTRIBUTION TO LINDLEY LIBRARY—						
Purchase of Books	36	3	5			
Expenses	53	0	0			
				89	3	5
„ SPECIAL EXPENDITURE—						
Contribution to Forrest Account	329	5	7			
Educational Models	68	13	10			
Paintings of British Orchids	56	10	4			
				454	9	9
„ DEPRECIATION—						
Hall Glass Roof, Furniture, and Appliances for Meetings				260	19	3
„ CONTRIBUTION TO WAR RELIEF FUND				1,000	0	0
				14,078	10	1
„ BALANCE, carried to BALANCE SHEET				8,434	19	11
				<u>£22,513</u>	<u>10</u>	<u>0</u>

FOR YEAR ENDING 31st DECEMBER, 1918.

Cr

	£	s.	d.	£	s.	d.
By ANNUAL SUBSCRIPTIONS				17,314	10	6
„ ENTRANCE FEES				244	13	0
„ DIVIDENDS AND INTEREST	2,183	7	9			
„ do. do. DAVIS TRUST	50	10	6			
				2,233	18	3
„ TAKINGS AT HALL MEETINGS				29	2	0
„ JOURNALS AND OTHER PUBLICATIONS—						
Advertisements	182	17	0			
Sale of Publications	1,992	16	8			
				2,175	13	8
„ HALL LETTINGS				7	12	6
„ PRIZES AND MEDALS				100	10	2
„ EXAMINATIONS IN HORTICULTURE—						
Received in Fees	315	7	6			
Less Amount Expended	255	2	9			
				60	4	9
„ LIFE COMPOSITIONS—						
Being amount paid by Fellows now deceased				84	0	0
„ RENT OF COTTAGES, WISLEY				62	8	0
„ INSPECTION OF GARDENS				200	17	2

£22,513 10 0

b

Dr.

VINCENT SQUARE—BALANCE

LIABILITIES.

		£	s.	d.	£	s.	d.
To CAPITAL FUNDS ACCOUNT—							
As at 31st December, 1917		46,404	3	0			
Less Fees paid by Fellows now deceased		84	0	0			
					46,380	3	0
„ LIFE COMPOSITIONS, 1918					239	8	0
„ SUNDRY CREDITORS					1,547	13	3
„ SUBSCRIPTIONS, &c., paid in advance					313	8	6
„ WISLEY SCHOLARSHIPS—							
Balance 31st December, 1917.					5	4	2
„ RESERVE ACCOUNT—HALL PAINTING—							
Balance 31st December, 1917.		973	13	4			
Added 1918		150	0	0			
					1,123	13	4
„ DEPRECIATION AND RENEWALS RESERVE ACCOUNT—							
Balance 31st December, 1917		3,003	10	9			
Added 1918.		260	19	3			
					3,264	10	0
„ LABORATORY PRIZE FUND—							
Balance 31st December, 1917		10	19	10			
Dividends (Nicholson Memorial Fund)		6	3	2			
					17	3	0
„ WILLIAMS MEMORIAL FUND					38	0	1
„ MASTERS MEMORIAL FUND					68	4	4
„ SCHRÖDER PENSION					6	11	8
„ LINDLEY LIBRARY TRUST					10	0	0
„ FRITZEL REVISION FUND					6	14	1
„ GENERAL REVENUE ACCOUNT		48,855	15	8			
Less Bad Debts		53	8	4			
					48,802	7	4
„ REVENUE FOR THE YEAR, as per annexed Account					£8,434	19	11
„ CAPITAL FUNDS' ACCOUNT, Wisley					142	0	10
					£8,577	0	9
Less WISLEY GARDENS, Excess of Expenditure over Income		4,480	3	0			
					4,096	17	9
					52,899	5	1
					£105,919	18	6

SHEET, 31st DECEMBER, 1918.

Cr.

ASSETS.

By CAPITAL EXPENDITURE—		£	s.	d.	£	s.	d.
NEW HALL AND OFFICES—							
As at 31st December, 1917		41,277	13	4			
FURNISHING HALL AND OFFICES—							
As at 31st December, 1917		2,464	9	8			
FREEHOLD LAND AND COTTAGES AT WISLEY		2,415	9	5			
					46,157	12	5
APPLIANCES FOR MEETINGS							
SUNDRY DEBTORS AND PAYMENTS MADE IN ADVANCE					236	11	0
WORKING WATER CO.—					2,303	11	9
Deposit in respect of laying water-mains from Ripley to Wisley Gardens					1,260	0	0
FOOD PRODUCTION—							
Amount due from Board of Agriculture					1,701	13	9
STOCK ON HAND, WISLEY—Coal and Coke		250	0	0			
" " " VINCENT SQUARE—Sundry Stocks		1,123	0	0			
					1,373	0	0
EDUCATION CHARTS, Johnson, Riddell & Co.					750	0	0
PRITZEL REVISION FUND—Loan Account					375	0	0
INVESTMENT OF DEPRECIATION and RENEWAL and RESERVE ACCOUNT—							
3½% India Stock £2,367 18 9 cost		2,211	12	10			
2½% Consols £476 8 4		280	1	1			
5% War Loan £500 0 0		467	11	0			
					2,959	4	11
INVESTMENTS, as per Schedule at cost					46,097	5	5
(In common with most pre-war Securities the above have, for sale purposes, considerably depreciated, but for revenue purposes they bring in the same income as before.)							
CASH—							
At Bank		617	7	9			
On Deposit		2,000	0	0			
In Hand		88	11	6			
					2,705	19	3
					£105,919	18	6

I have audited the books from which the foregoing Accounts are compiled, and certify that they exhibit a true and correct statement of the position of the Society on the 31st Dec., 1918.

ALFRED C. HARPER, F.C.A., Auditor,
(HARPER BROTHERS & FEATHER, Chartered Accountants),
35 GREAT TOWER STREET, LONDON, E.C.

17th January, 1919.

Dr. WISLEY GARDENS—ANNUAL REVENUE & EXPENDITURE

	£	s.	d.	£	s.	d.	£	s.	d.
To SALARIES—									
Wisley Gardens and Research Station	1,655	10	2						
Do. Bonuses	357	18	10						
							2,013	9	0
„ RATES AND TAXES				114	5	8			
„ WATER RATE				45	2	0			
„ INSURANCES				59	7	5			
„ LABOUR	1,789	5	2						
„ GARDEN IMPLEMENTS				19	1	0			
„ LOAM AND MANURE				47	8	8			
„ REPAIRS				246	1	7			
„ FUEL				416	19	10			
„ MISCELLANEOUS EXPENSES—									
Garden	246	16	7						
Laboratory	102	18	3						
				349	14	10			
„ CARTAGE				93	5	3			
„ TREES AND SHRUBS				9	19	6			
							3,190	10	11
„ COST OF GROWING, PACKING AND DISTRIBUTION OF PLANTS TO FELLOWS							169	4	3
„ STAFF PENSION				198	18	4			
Less contributed by the Staff, as per scheme				66	10	0			
							132	8	4
„ DEPRECIATION—									
Glass Houses, Plant and Materials							540	18	6
							<u>£6,046</u>	<u>11</u>	<u>0</u>

ACCOUNT FOR YEAR ENDING 31st DECEMBER, 1918. Cr.

	£	s.	d.	£	s.	d.
By DIVIDENDS AND INTEREST				1,058	3	11
" PRODUCE SOLD				492	9	1
" STUDENTS' FEES				15	15	0
" BALANCE, being excess of Expenditure over Revenue				4,480	3	0

£6,040 11 0

Dr.

WISLEY GARDENS—BALANCE

LIABILITIES.

	£	s.	d.	£	s.	d.
To CAPITAL FUNDS ACCOUNT—						
As at 31st December, 1917	33,074	14	4			
Less Amount transferred to R.H. Society,						
31st December, 1918	142	0	10			
				32,932	13	6
„ ENDOWMENT FUND				25,000	0	0
„ DEPRECIATION AND RENEWALS—						
As at 31st December, 1917	3,851	8	3			
Added, 1918	340	3	6			
				4,191	11	9

£62,124 5 3

SHEET, 81st DECEMBER, 1918.

Cr.

ASSETS.

By DWELLING HOUSES—						
As at 31st December, 1917	£	s.	d.	£	s.	d.
	5,651	17	4			
" GLASS HOUSES, RANGES, POTTING SHED, &c.—						
As at 31st December, 1917	£	s.	d.			
	5,202	6	0			
" LABORATORY—						
As at 31st December, 1917	£20,502	15	4			
Expenditure since	121	2	10			
				20,623	18	2
					31,478	1 6

N.B.—The Wisley Estates are, under the Trust Deed, vested in the Society only so long as it is in the position to use them as an Experimental Garden. The value of the expenditure thereon depends therefore on the continual use of the Garden by the Society.

INVENTORY OF PLANT AND LOOSE EFFECTS— As taken by Mr. Chittenden	1,184	3	0
LIBRARY	270	9	0
	<hr/>		
	32,932	13	6

INVESTMENT OF DEPRECIATION AND RENEWALS		32,932 13 0
RESERVE ACCOUNT—		
£2,981 11s. 10d. 3½% India Stock		
cost	£2,772 7 0	
£705 15s. 3d. 2½% Consols cost	415 8 10	
£650 5% War Loan cost	607 17 0	
	<hr/>	
	3,795 12 10	
Add Cash for Investment, 1918	395 18 11	
	<hr/>	
		4,191 11 0
INVESTMENTS—		
Great Eastern Railway Company 4% Debenture Stock £3,500	3,535 0 0	
Leopoldina Railway Company, Ltd. 5% Terminable Debentures £2,000	2,000 0 0	
City of Moscow Loan 1912. 4½% Bonds £6,000	5,730 0 0	
Buenos Ayres Great Southern Railway Company 5% Non-Cumulative Preference Stock £2,500	2,825 0 0	
War Stock 4½% 1925-45, £5,000	5,000 0 0	
Canadian Pacific Railway Company 4% Perpetual Consolidated Debenture Stock £4,632	3,890 17 6	
Consols 2½% £3,229 5s. 6d.	1,889 2 6	
London County Consolidated 3½% Stock £135 8s. 4d.	130 0 0	
	<hr/>	
		25,000 0 0

(In common with most pre-war Securities, the above have, for sale purposes, considerably depreciated, but for revenue purposes they bring in the same income as before.)

£62,124 5 3

I have audited the books from which the foregoing Accounts are compiled, and certify that they exhibit a true and correct statement of the position on the 31st Dec., 1918.

ALFRED C. HARPER, F.C.A., *Auditor,*
(HARPER BROTHERS & FEATHER, *Chartered Accountants*),
35 Great Tower Street, London, E.C.

17th January, 1919.

Dr.

ALFRED DAVIS

Bequeathed to the Society in 1870 for Annual Prizes,

	£	s.	d.	£	s.	d.
To Amount of Fund, 31st December, 1917	1,797	8	9			
„ Dividends received 1917				50	10	6

WILLIAMS

Raised by Donations in 1891 in Memory of

	£	s.	d.	£	s.	d.
To Amount of Fund, 31st December, 1917	204	2	5			
„ Balance 31st December, 1917				29	17	3
„ Dividends received 1918				8	2	10
				38	0	1

MASTERS

Raised by Donations in 1908 in Memory of Dr. Masters

	£	s.	d.	£	s.	d.
To Amount of Fund, 31st December, 1917	542	17	0			
„ Balance 31st December, 1917				48	19	4
„ Dividends received 1918				19	5	0
				68	4	4

NICHOLSON

Raised by Donations in 1908 in Memory of

	£	s.	d.	£	s.	d.
To Amount of Fund, 31st December, 1917	160	12	11			
„ Dividends received 1918				6	3	2

SCHRÖDER

Provided by Royal Horticultural Society in Memory of the late Baron

	£	s.	d.	£	s.	d.
To Amount of Fund, 31st December, 1917	557	14	6			
„ Balance 31st December, 1917				7	1	8
„ Dividends received, 1918				19	10	0
				26	11	8

TRUST FUND.

Cr.

or in any other way the Council may determine,

By Consols, £2,022 8s. 9d.	cost	£	s.	d.	£	s.	d.
„ Revenue and Expenditure Account		1,797	8	9			
					50	10	6

MEMORIAL FUND.

B. S. Williams towards Prizes and Medals.

By East India Railway Co. Annuity, Class B £7	£	s.	d.	£	s.	d.
„ New South Wales Government 4 per cent. Inscribed Stock (1942-62) £36 3s. 1d.	168	0	0			
	36	2	5			
	204	2	5			
„ Balance in hands of R.H. Society				38	0	1
				38	0	1

MEMORIAL FUND.

towards the Provision of one or more Annual Lectures.

By Midland Railway Consolidated 2½ per cent. Perpetual Preference Stock £400	£	s.	d.	£	s.	d.
„ Midland Railway Consolidated 2½ per cent. Perpetual Guaranteed Preferential Stock £400	290	13	6			
	252	3	6			
	542	17	0			
„ Balance in hands of R.H. Society				68	4	4
				68	4	4

MEMORIAL FUND.

George Nicholson for Prizes to Wisley Students.

By Tasmanian Government 4 per cent. Inscribed Stock (1940-50), £162 4s. 5d.	£	s.	d.	£	s.	d.
„ Transfer to Wisley Prize Fund	160	12	11			
				6	3	2

PENSION.

Schröder to pay to Gardeners' Royal Benevolent Institution for one Pension.

By Great Western Railway 4 per cent. Debenture Stock £500.	£	s.	d.	£	s.	d.
„ Gardeners' Royal Benevolent Institution	557	14	6			
„ Balance in hands of R.H. Society				20	0	0
				6	11	8
				26	11	8

Dr.

LINDLEY LIBRARY

	£	s.	d.	£	s.	d.
To Amount of Fund 31st December, 1917.	6,231	18	10			
„ Contribution from R.H. Society, 31st December, 1918	36	3	5			
	<u>6,268 2 3</u>					
To Balance 31st December, 1917				10	9	6
„ Dividends and Donations received 1918				46	10	6
„ Contribution from R.H. Society, 31st December, 1918				53	0	0
				<u>110 0 0</u>		

PRITZEL REVISION

Fund to be raised for the Revision of Pritzel's Iconum-

	£	s.	d.	£	s.	d.
To Amount of Fund, 31st December, 1917.	859	2	2			
„ Balance, 31st December, 1917				122	7	3
„ Dividends received 1918				32	17	11
„ Loan from R.H. Society, repayable				375	0	0
				<u>530 5 2</u>		

TRUST.

C.

	£	s.	d.	£	s.	d.
By Lancashire and Yorkshire Railway 3 per cent. Consolidated Preference Stock £1,516 held by the Charity Commissioners	1,458	15	7			
" Value of Library, 31st December, 1917	4,773	3	3			
" Purchase of Books, 1918 (<i>See Report</i>)	36	3	5			
	6,268	2	3			
By Librarian's Salary				100	0	0
" Balance in hands of R.H. Society				10	0	0
				110	0	0

FUND.

Botanicarum Index. Estimated cost, £3,500.

	£	s.	d.	£	s.	d.
By India 2½ per cent. Stock £1,367 13 6	859	2	2			
" Amount expended, 1918				523	11	1
" Balance in hands of R.H. Society				6	14	1
				530	5	2

SCHEDULE OF INVESTMENTS.

31st December, 1918.

		£	s.	d.
2½ %	Consols £5,324 19s. 8d.	cost	5,081	6 0
3 %	Local Loans £5,800	„	6,006	16 6
3½ %	Indian Rupee Paper 37,000 Rupees	„	2,462	14 4
3½ %	Dominion of Canada Registered Stock (1930-1950), £2,000	„	2,000	0 0
3½ %	London County Consolidated Stock £2,864 11s. 8d.	„	2,884	6 10
3½ %	India Stock £2,063. 4s.	„	2,024	10 4
5 %	Havana Terminal Railroad Company Mortgage Debenture Bonds £8,300	„	8,946	0 0
4½ %	Central Argentine Railway, Limited, Consolidated Preference Stock £2,800	„	2,907	3 6
5 %	State of San Paulo Treasury Bonds (1913) £3,100	„	2,862	11 9
4 %	Central Argentine Railway, Limited, Debenture Stock £600	„	537	15 10
2½ %	India Stock £186 9s.	„	109	2 2
4 %	Mortgage on Freehold £1,000	„	1,000	0 0
5 %	War Loan, £9,500	„	9,274	18 2
			<u>£46,097</u>	<u>5 5</u>

GENERAL MEETING.

xxix

GENERAL MEETING.

FEBRUARY 25, 1919.

Mr. A. W. SUTTON, V.M.H., in the Chair.

Fellows elected (45).—Mrs. R. T. Bakewell, F. G. Ball, H. W. Barber, R. N. Barwell, Mrs. Bellows, G. E. Blundell, Miss W. Bolus, Miss W. D. Brown, J. Cairnes, Lady Carson, Mrs. C. Colley, M. B. Davis, C. E. Dowdeswell, T. P. Edwards, G. Geale, Lieut. C. Grant-White, E. Grove, F. S. Harvey, Miss V. M. Hughes, Mrs. J. K. im Thurm, G. L. Jarrett, L. C. P. Jones, W. Julian, J. Kennedy, J. Little, J. W. Lomax, Mrs. E. L. Lovatt, J. H. Marsden, J. A. Paice, Major G. Palmer, B. Parry, Stanley Peck, Mrs. A. W. Perks, Miss C. Price, J. W. Rob, A. R. N. Rooksby, J. E. Taylor, J. J. Thompson, F. J. Varley, J. A. Waghorn, A. R. Wells, J. White, J. G. Wilson, A. C. Woodward, W. Wright.

Fellows resident abroad (3).—G. D. Bosshere, B. H. Moller, W. Smallman.
Associates (5).—Miss S. Barker, Miss M. B. Bindley, Miss M. French, Miss C. N. L. Motherwell, Miss J. Smallwood.

Societies affiliated (10).—Bournemouth (Borough of) Allotment Society, Cambridge and District Bee-keepers' Association, Cheadle Hulme Allotment Holders' Society, Douglas Horticultural Society, Henley in Arden District Allotment Society, Kimpton Horticultural Improvement and Cottage Gardening Society, Leadgate, Investon and District Amateur Gardeners' Society, Llanfoist Horticultural Society, Pontypool Allotment Holders' Association, Stratford-upon-Avon Allotment Association.

A lecture on "The Care of our Soldiers' Graves" was given by Capt. A. W. Hill, M.A. (p. 1).

GENERAL MEETING.

MARCH 11, 1919.

Mr. W. A. BILNEY, J.P., in the Chair.

Fellows elected (44).—Mrs. C. Allen, Mrs. H. Atherley-Jones, Miss A. R. Baring, R. Berks, Miss L. E. Blyth, T. W. Briscoe, Mrs. G. Bush, A. G. Carver, C. A. Corke, P. A. Culling, Lady Davies, M. B. Davie, Mrs. M. Debenham, Miss E. C. Diarmid, W. Dickinson, Lieut.-Col. E. G. Evans, H. S. Folley, D. Gidlow, Mrs. M. Gow, W. Harwood, W. M. Heald, J. Hefferman, Mrs. M. Herring, F. J. Ingleby, Mrs. I. Ingleby, N. E. Lamplugh, C. T. Lloyd, Mrs. E. A. C. Lloyd, C. E. Lovett, Mrs. E. K. Macmorran, D. C. Messant, Mrs. E. L. Midwood, E. Mobbs, Mrs. I. H. Rees Price, H. B. Saltmarsh, G. Shepperson, R. L. Soper, G. L. Stanbridge, F. T. Stokes, Dr. B. Taylor, G. H. Thomas, F. E. Trelawny, J. Weston, Mrs. L. D. Wigan.

Fellows resident abroad (5).—A. Deshumkh, Mrs. H. S. Harde, H. Howlett, V. G. Mandke, R. F. Silvers.

Associates (6).—A. H. Knight, S. Lion, Miss M. G. Penrose-Thackwell, Mrs. E. E. Stracey, W. J. Taylor, F. Usherwood.

Societies affiliated (8).—Aspatria Allotment Holders' Association, Bovey Tracey Horticultural Society, Cartland Road Allotment Association, Helensburgh Allotment Holders' Association, Hertford Horticultural Society, Long Eaton Garden Holders' Association, Orston, Elton, Thoroton Allotment Association, Stocksbridge and Deepcar Allotment Society.

A lecture on "The Public Parks of Glasgow" was given by Mr. J. Whitton, V.M.H. (p. 39).

GENERAL MEETING.

MARCH 25, 1919.

Sir ALBERT K. ROLLIT, LL.D., in the Chair.

Fellows elected (42).—H. T. Ann, Col. A. S. Barham, S. A. Baxter, Miss M. L. Boddam, Lady Helen Boyle, A. R. Cook, Mrs. V. M. Cooper, F. W. Crampton, Col. W. H. Faskin, Miss L. Franks, F. N. Garry, W. J. George, F. A. Gibbins, B. R. Goode, E. J. Guerin, J. Hamilton, M. Hutchins, A. O. Jefferys, F. Knight, P. Knight, Miss M. L. Lewis, Miss M. Van-Vleck Lidgerwood, Mrs. M. Longden,

XXX PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Mrs. M. Lucy, G. W. Miles, Mrs. Mitchison, H. G. Moberly, E. W. Morris, Mrs. A. E. Neame, Miss E. Norton, W. H. Robbins, L. E. Roberts, Major W. R. Rook, J. C. Russell, R. F. McNair Scott, A. F. Smith, Lt.-Col. Soltau-Symons, Miss I. H. Stringer, Mrs. M. F. Vincent-King, Col. F. D. Watney, F. E. Winsland, R. Wittey.

Fellows resident abroad (1).—A. Davies, Sydney, Australia.

Associates (2).—Miss L. Jenkins, Miss A. F. Peake.

A lecture on "The Study of Economic Botany and the Professional Openings it offers" was given by Mr. E. White (p. 81).

Professor BICKERTON of New Zealand endorsed in the most emphatic terms all that the lecturer had said on the subject, and it was proposed by Sir ALBERT ROLLIT, seconded by Professor BICKERTON, and carried unanimously that a memorandum which had been prepared by the Secretary be sent to the Press.

Sir ALBERT ROLLIT, in proposing a vote of thanks to the lecturer, called attention to the great work being done by the Society in the direction of science as applied to Horticulture and Botany, and of the Society's need for a greatly increased Fellowship to help to meet the heavy financial burden which its work now involved (see also Annual Meeting). There was a unanimous expression of opinion at the Meeting which resolved that the Government should afford the Society financial support for its scientific and experimental work, and it was hoped that the Council would lose no time in taking steps to make representations to the Government in this direction. The vote of thanks to the lecturer was carried with acclamation.

GENERAL MEETING.

APRIL 8, 1919.

Mr. E. A. BOWLES, M.A., in the Chair.

Fellows elected (53).—J. E. Allnatt, Miss L. Benest, Mrs. A. Bond, H. Buchan, C. Cassidy, W. E. Catesby, H. Catchpole, G. Chambers, Mrs. A. Clarke, A. T. Collier, G. S. Colville, Lieut.-Col. H. Daly, J. K. Davies, Mrs. Dearmer, Miss A. A. Dunlop, Capt. R. Eliot, Mrs. H. England, Miss K. Forrest, Miss A. D. Francis, E. Goodyear, Miss Hannen, E. Harper, C. A. Harris, Col. W. C. Horsley, S. W. Jones, A. H. Lawrence, L. Lovell-Keay, Mrs. A. McCabe, W. H. Miles, H. Nevill, Miss E. M. Newbold, Mrs. J. H. Oxley, Mrs. Pilkington, A. W. Punnett, G. L. Radford, Col. W. C. Radford, Col. W. C. Riddell, Lady St. Audries, J. S. W. Saunders, E. Semper, A. Sharnbrook, J. A. Sinclair, R. J. M. Skarratt, Mrs. E. J. Stannard, W. B. Sweeting, A. T. Teniers, F. Thompson, C. L. Wallace, Capt. L. Wand, W. Whitehead, W. R. Wynton.

Societies affiliated (2).—Carnforth and District Gardeners' Association, Park and Dare Allotment Societies, Ltd.

A lecture on "Freeseias and Lachenalias" was given by the Rev. J. Jacob (see p. 29).

GENERAL MEETING.

APRIL 29, 1919.

Lord LAMBOURNE, C.V.O., in the Chair.

Fellows elected (88).—F. D. Andrews, A. M. Anson, Miss E. S. Aspland, R. Bastin, N. T. Bengough, M. S. Bles, Mrs. P. Bristow, G. C. Bushby, Mrs. F. Chancellor, R. Collinson, Mrs. B. Cotton, F. W. Deas, Mrs. Deneke, R. J. P. Dix, G. A. Farnan, Lady Farquhar, Lady Farren, Mrs. F. Fraser, C. T. Gooch, B. Goodacre, Mrs. F. Gordon, Mrs. B. Goschen, Major A. B. Gracie, H. C. Green-grass, Mrs. E. Harding, G. C. Haslock, R. G. Hatton, Mrs. E. J. Hawes, J. T. Haynes, Mrs. J. A. Hirst, S. Hodgkin, J. Hodgson, Mrs. W. Hussey, Mrs. Hutt, O. A. Jenkins, H. Joy, P. C. Kay, Lady H. Keppel, P. V. Kerr, H. P. Kingham, Rev. A. L. Kynaston, Miss C. M. Lampard, H. W. Learoyn, T. A. M. Lockhart, S. H. Lord, J. Mackay, J. W. McKeachie, Major N. McLeod, Mrs. R. Makower, B. Martin, Lady Maxwell, A. J. Mayes, Lady Mayo-Robson, H. F. Mercer, D. Mooney, A. W. Morley, Mrs. M. R. Moser, Mrs. P. P. Ness, Mrs. G. Nevill, Duchess of Northumberland, D. C. Orr, E. Page, T. Parker, Miss L. Playfair, R. R. Pulling, Mrs. Purchase, Mrs. Shalless, J. Smith, Mrs. G. Somers-Smith, Miss H. Stokes,

H. Stowell, D. T. Thomas, F. H. Thompson, T. W. Tibbetts, Mrs. Usborne, A. J. Voisin, A. Wagg, Mrs. T. E. Walsh, Capt. F. Warrington-Strong, Mrs. A. C. Watts, L. Weaver, Mrs. L. Weaver, E. E. Wigan, D. Wilson, Mrs. H. Wilson, Mrs. E. A. Wood, H. S. Woodcock, Mrs. J. Young.

Fellows resident abroad (6).—P. Falk, S. T. Kawa, Miss D. H. MacRae, S. A. Moysard, Capt. S. Pickard, J. P. S. Sellschopp.

Associates (7).—T. Cannon, R. Hale, J. Heaton, S. Jones, R. Murrell, Miss H. M. Stephens, R. Sudell.

Societies affiliated (2).—Barnard Castle and District Allotment Holders' Association, Pilkington Allotment Holders' Association.

SCIENTIFIC COMMITTEE.

JANUARY 14, 1919.

Mr. E. A. BOWLES, M.A., V.M.H., in the Chair, and five members present.

Bulbils in Leek Inflorescence.—Mr. W. Cuthbertson showed a large inflorescence of the common Leek in which each of the flowers was replaced by one or more bulbils, as is frequent in many species of *Allium*. Mr. Cuthbertson, in a long experience, had never met with a similar case.

Substitute for Caraway seed.—Mr. Bowles showed seed of Dill, which is being used as a substitute for Caraway seed. In the opinion of the Committee there seems no reason why Caraway seeds should not be grown in England to supply all our requirements.

Fruits from Salonika.—Mr. Bowles also showed fruits of an Asclepiadaceous plant, which Mr. W. C. Worsdell took for identification.

Primula juliae hybrid.—Mr. Rosenheim sent a fine-flowered hybrid of *Primula juliae*, which had occurred in his garden, and which he thought might be a hybrid with *P. leucophylla*.

SCIENTIFIC COMMITTEE, JANUARY 28, 1919.

Mr. E. A. BOWLES, M.A., V.M.H., in the Chair, and five members present.

Fruits from Salonika.—Mr. W. C. Worsdell, F.L.S., reported that he had compared the fruits shown by Mr. Bowles at the last meeting with herbarium specimens, and had identified them as *Marsdenia erecta* and *Periploca graeca*.

Flowers as aids to identification in Apple.—Mr. C. H. Hooper, F.S.I., drew attention to a series of photographs of Apple stamens and styles made in Victoria Australia, and published in the *Journal of the Dep. of Agr. for Victoria*, and remarked upon the great range of variation in arrangement and form exhibited. Unfortunately not all the flowers had been photographed at the same stage of development, but there can be no doubt that floral details may be a great aid in the identification of Apple varieties, and also in all probability to their classification.

Rogues in Beet.—Mr. F. J. Baker, A.R.C.S., drew attention to the presence of long, tangy roots of a white colour in a crop of Beets grown from home-saved seed of a particularly good stock of Globe Beets in an allotment garden. It had been suggested that the result was due to crossing with Spinach, but it seems more likely that crossing with either Mangolds or some other variety of Beet had occurred, for it is well known that crossing readily occurs among Beets unless they are separated by very long distances. It is, of course, possible that segregation in the F_1 generation was occurring.

Pritzel Committee.—Mr. Bowles announced that the Council were about to appoint an official representative of the Scientific Committee to act upon the Pritzel Committee, and the name of Dr. A. B. Rendle, F.R.S., was suggested and unanimously approved. Dr. Rendle is now Professor of Botany to the Society.

Erythraea scilloides.—Mr. T. B. Rhys, of Tenby, wrote saying that he had discovered *Erythraea scilloides* growing wild in north Pembrokeshire. It had been identified at the British Museum and had never previously been recorded as wild in the British Isles.

SCIENTIFIC COMMITTEE, FEBRUARY 11, 1919.

Mr. E. A. BOWLES, M.A., V.M.H., in the Chair, and four members present.

Nectria cinnabarina.—Mr. E. A. Bowles showed a branch of an Acer covered with the numerous coral spots produced by this fungus in its fruiting stage. The fungus is exceedingly common on a variety of woody plants. It is a wound parasite, invading and killing the healthy tissue about the wound, and not producing its fruit until it has killed the wood invaded. The treatment consists

of cutting out the infected portions well behind the part on which the fungus fruits are produced and behind any parts showing a brown discoloration in the wood.

Hardy Maize.—Prof. R. C. Punnett, F.R.S., sent an exhibit showing ripe cobs of two varieties of Maize ripened in Cambridge, one yellow, the other cream, and both of the hard-corn type. These had been raised by him by crossing different varieties as recounted in *Gard. Chron.*, January 11, 1919. A Certificate of Appreciation was unanimously recommended for the work done by Prof. Punnett in raising these varieties.

Primula variabilis and *Narcissus Tazetta* var.—Mr. G. C. Druce sent specimens of the hybrid between *Primula vulgaris* and *P. veris* with small coloured flowers, often grown in gardens under the name *P. variabilis*, and found in abundance near Pulborough in an apparently wild state. He also sent a form of *Narcissus Tazetta*, near "Paper White," collected as an escape near Yiewsley, Middlesex.

SCIENTIFIC COMMITTEE, FEBRUARY 25, 1919.

Mr. E. A. BOWLES, M.A., V.M.H., in the Chair, and five members present.

Potato Disease.—Mr. F. J. Baker, A.R.C.S., drew attention to a common practice of throwing out partly diseased potato tubers when the clamps are opened in spring, and permitting them to lie about until much later. He considered these tubers a source of danger, in that growth might start and the disease occur upon it, spreading thence to shoots of plants cultivated near. He thought it wise to collect and destroy such tubers; they may be boiled and fed to pigs, when any danger would be removed, but they should not find their way into sties, &c., without previous cooking.

Artificial Production of Natural Hybrids.—Mr. R. A. Rolfe, A.L.S., showed a plant under the name of *Odontoglossum* \times *Humeanum* Rchb. f. This had been raised by pollinating *O. maculatum* by *O. Rossii*. Reichenbach suggested *O. cordatum* and *O. Rossii* as the parents of the plant to which it is believed that he attached the name *O. x Humeanum*, but Mr. Rolfe can find no trace of *O. cordatum* in the wild plant or evidence that the two supposed parents grow together in the wild state. A plant was described after Reichenbach's *Humeanum* as *O. x aspersum* Reich. f. and the parentage *O. maculatum* \times *Rossii* ascribed. It was believed to be a natural hybrid, and the plant now exhibited is exactly identical. The plant originally called *O. x Humeanum* appears to have been lost. The plant exhibited was raised by Mr. Rolfe in the collection of F. H. Moore, Esq., Royal Infirmary, Liverpool, and has now, after nineteen years, flowered at Kew. A figure of the plant (*O. x Humeanum*) is given in *Reichenbachia*, ser. I, ii. pp. 75-82, and the full history of the plant exhibited in *Orch. Rev.* xxvii. p. 4). The Committee unanimously recommended a Certificate of Appreciation to Mr. Rolfe for the work he had done in raising this plant.

Spiral Hazel.—Mr. Gurney Wilson, F.L.S., showed a stem of hazel from a railway cutting at Haywards Heath, Sussex, having a deep and broad spiral groove traversing it. Such grooves are usually the result of the growth of either honeysuckle or Clematis on the young stem.

Colouring of Leaves by Fungus Spores.—Mr. Bowles showed ivy leaves coloured deep brown by the presence of numerous spores of the fungus *Polyporus igneus*, which had formed its fruits upon the stem of a horse-chestnut above the ivy. The leaves were completely covered.

Narcissus aberrant.—Mr. J. K. Ramsbottom sent flowers of a Polyanthus *Narcissus* from Scilly in which the terminal flower of the inflorescence had in each case eight perianth pieces.

SCIENTIFIC COMMITTEE, MARCH 11, 1919.

Mr. E. A. BOWLES, M.A., V.M.H., in the Chair, and five members present.

Odontoglossum x aspersum.—Mr. G. Wilson, F.L.S., showed several early drawings of the plant known as *O. x Humeanum* and the alleged parents, and of *O. x aspersum* and its parents.

Variations from Root Cuttings of Bouvardia.—Dr. W. Bateson, F.R.S., exhibited drawings of *Bouvardia* 'Bridesmaid,' and of the plant raised from it

XXXIV PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

bearing double flowers similar to the variety 'Hogarth,' exhibited at the meeting of the Committee in January 1916. He now showed drawings of a single form, raised from a root cutting of the form like 'Hogarth,' dissimilar to any cultivated at Merton. He also showed drawings of a Regal Pelargonium with another of a plant raised as a root cutting from it having flowers many shades deeper than the parent. Mr. Bowles said that he had met with a case of such variation in *Anchusa italica*. A white variety appeared, and on attempts being made to propagate it by root cuttings all (or most of) the plants came blue.

Seedlings of Myosotis 'Pride of Zurich.'—Dr. Bateson said that seedlings of the *Myosotis* form known as 'Pride of Zurich,' in which the petals have a white stripe down the centre, when the seed was obtained under protection from insect pollination all gave white flowers. The seedlings from plants raised in the open have either blue or white flowers, not striped ones. In one case a blue-flowered seedling bore a branch producing white flowers with a blue central stripe unlike anything before met with. The production of white-flowered seedlings suggested that the ovules were produced from the portion of the carpel corresponding with the white central stripe in *Myosotis 'Pride of Zurich.'*

Crocus with Markings of Outer like those of Inner Segments.—Mr. Bowles showed a *Crocus* having some of the outer segments without the feathered markings like those of the inner, one flower so differing had occurred on the same parent corm with a normally coloured one. Others had a portion of one of the outer segments half within the others and unfeathered, the other half, which had been exposed, being feathered.

Galanthus nivalis green-tipped.—Mr. Bowles also showed a fine flower of *Galanthus nivalis* with a green tip to the outer segments. Such forms appear to occur in all the species of *Galanthus* and are usually associated with a malformed spathe.

SCIENTIFIC COMMITTEE, MARCH 25, 1919.

Mr. E. A. BOWLES, M.A., V.M.H., in the Chair, with three members present and Rev. J. JACOB, visitor.

"Breaking" of Freesias.—Rev. J. Jacob showed examples of *Freesia* flowers exhibiting the phenomenon, so well known in Tulips, of concentration of colour in certain areas, whereas the colour in flowers of the (vegetative) parent corm had been diffused. The example shown was in the variety 'Whitewell,' where the delicate tint of the parent had become intensified within a smaller area, and was not nearly so pleasing. He was unable to account for the change by any differences in cultivation or other causes.

Fruiting of Hedychium Gardnerianum.—Mr. J. Fitt, Frythe Gardens, Welwyn, Hertfordshire, sent a shoot of *Hedychium Gardnerianum* bearing fruit. At ripening, the fruit (which has been enclosed till then within the valves of the spathe) is exposed and its bright red valves burst apart, showing the black seeds on a red column within. The fruit is about 1 inch in length.

SCIENTIFIC COMMITTEE, APRIL 8, 1919.

Mr. E. A. BOWLES, M.A., V.M.H., in the Chair, and four members present.

Hybrid Freesias.—Mr. Dalrymple brought a large number of forms of *Freesia* which his brother, Mr. H. Dalrymple, had raised at Bartley, near Southampton. The range of colour was extraordinary, from yellow and bronze flowers to pink and purple. A Certificate of Appreciation was unanimously recommended to Mr. Dalrymple for work in raising these new *Freesias*.

A Multiple Flower of Narcissus.—From the same source came a flower of *Narcissus 'Minnie Hume'* with double the number of parts normally present.

Bamboos at Gunnersbury and Enfield.—Mr. Bowles showed specimens to illustrate the manner in which Bamboos had suffered from the weather during the past season, while Mr. J. Hudson, V.M.H., brought others from Gunnersbury in the best of condition. The climatic conditions in the two localities, though so near, must have been markedly different. Mr. Hudson attaches great importance to planting Bamboos in moist soil, never on banks.

SCIENTIFIC COMMITTEE, APRIL 29, 1919.

Mr. E. A. BOWLES, M.A., V.M.H., in the Chair, and three members present.

Insects pollinating mistletoe.—Mr. Bowles referred to the subject of insect-pollination of mistletoe, saying that he found certain insects persistently working the flowers, returning to them again and again, particularly Diptera, and he thought there could be no doubt that they were the agents effecting pollination. He had captured many and they had been identified at the British Museum as *Sepsis cynipsea* (4), *Chlorops* sp. (3), *Tephrochlamys rufiventris* (3), *Pyrellia lasiophthalma* (2), *Musca autumnalis* (1), *Scatophaga stercoraria* (1), *Elachyptera cornuta* (1). With one exception these were different flies from those captured at mistletoe last year (see JOURNAL R.H.S. xlv. p. xlix).

Malformed Cypripedium.—*Cypripedium* 'Euryades,' New Hall Hey var., with the dorsal part of the flower doubled, was sent by Mr. C. J. Lucas, of Horsham. Both dorsal sepal and rostellum were paired.

Wood of Cecropia.—A piece of stem of *Cecropia* was sent by Mrs. G. E. Bullar, picked up on the shore at L'Islet, Guernsey. The wood is extremely light and has large pith cavities with transverse walls at intervals of about two inches. Dr. Rendle, who identified the specimen, says that the pith cavities are, in the young stem, often occupied by ants, and that the natives of W. Indies and S. America, where the tree grows wild and reaches a height of from 40 to 60 feet and a diameter of a foot, use the hollow stems as wind instruments, whence the name 'Trumpet-Wood.'

FRUIT AND VEGETABLE COMMITTEE.

JANUARY 14, 1919.

Mr. C. G. A. NIX in the Chair, and fourteen members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Messrs. Sutton, Reading, for hardy winter vegetables.

Silver Knightian Medal.

To Mr. R. Staward, Panshanger, for Leeks.

Other Exhibit.

Mr. H. Close, Orpington: Apple 'Gunner Buckwell.'

FRUIT AND VEGETABLE COMMITTEE, JANUARY 28, 1919.

Mr. C. G. A. NIX in the Chair, and fifteen members present.

It was unanimously resolved to send a vote of condolence to the family of the late Mr. George Bunyard, V.M.H., who was for so many years the deeply respected Chairman of this Committee.

Awards Recommended:—

Silver-gilt Knightian Medal.

To Lady Elizabeth Dawson, Maidenhead, for bottled fruits and vegetables.

First-class Certificate.

To Apple 'St. Cecilia' (votes unanimous), from Messrs. Basham, Bassaleg, nr. Newport. This variety received an Award of Merit on January 15, 1918. Fruit of medium size, even in outline, but of different shapes, some conical, others flat; skin yellow and nearly covered with red, with a good deal of russet round the stalk; eye small, and nearly closed in a shallow and slightly plaited saucer; stalk about half an inch long, inserted in a small funnel set in a very full base; flesh crisp, juicy, fine flavour, somewhat resembling that of 'Cox's Orange Pippin,' which is one of its parents, the name of the other parent having been lost. The tree is said to be a strong, vigorous grower, and a free bearer, a very promising variety that should be a valuable addition to our late dessert Apples. (See JOURNAL R.H.S., xliv. p. lv., fig. 36).

Other Exhibits.

Messrs. Whitelegg, Chislehurst: Onions.

FRUIT AND VEGETABLE COMMITTEE, FEBRUARY 11, 1919.

Mr. C. G. A. NIX in the Chair, and eleven members present.

Awards Recommended:—

Silver Knightian Medal.

To Messrs. Sutton, Reading, for winter vegetables.

Previous Awards Confirmed.

To Mr. V. Banks, Food Production Department, for bottled fruits and vegetables.

Other Exhibits.

Mr. P. Chennell, Dorking : seedling Apple.
 Mr. W. Peters, Leatherhead : Onion 'Globe Keeper.'

FRUIT AND VEGETABLE COMMITTEE, FEBRUARY 25, 1919.

Mr. C. G. A. NIX in the Chair, and fifteen members present.

No awards were recommended on this occasion.

Exhibit.

Messrs. Laxton, Bedford : Apple 'Laxton's Superb.'

FRUIT AND VEGETABLE COMMITTEE, MARCH 11, 1919.

Mr. J. CHEAL, V.M.H., in the Chair, and thirteen members present.

Award Recommended :—

Silver Knightian Medal.

To Messrs. Sutton, Reading, for vegetables.

Other Exhibits.

Mr. J. Leeder, Postwick : Apple 'Leeder's Perfection.'
 R.H.S. Gardens, Wisley : early Rhubarb and Apple 'Surecrop.'
 Mr. G. G. Whitelegg, Chislehurst : Onion 'Cooper's Density.'

FRUIT AND VEGETABLE COMMITTEE, MARCH 18, 1919.

SUB-COMMITTEE AT WISLEY.

Mr. W. POUPART in the Chair, and four members present.

The Sub-Committee inspected the trial of Kales and made recommendations for awards.

FRUIT AND VEGETABLE COMMITTEE, MARCH 25, 1919.

Mr. J. CHEAL, V.M.H., in the Chair, and twelve members present.

Awards Recommended :—

The following awards recommended by the Sub-Committee to Kales on trial at Wisley were confirmed :—

Award of Merit.

No. 64. Ormskirk Hearting Curled Greens, sent by Mr. Clucas.

Highly Commended.

No. 1. Cottager's Kale, sent by Messrs. R. Veitch ; No. 7. Dwarf Purple Curled, sent by Messrs. Barr ; No. 22. Extra Curled Scotch, sent by Messrs. Sutton ; No. 41. Favourite, sent by Messrs. Sutton ; No. 35. Green Curled, sent by Messrs. Sydenham ; No. 46. Improved Hearting, sent by Messrs. Sutton ; No. 29. Purple Plume, sent by Messrs. Carter ; No. 27. Scotch Kale Selected, sent by Messrs. Barr ; No. 13. Jerusalem Purple, sent by Messrs. Barr ; No. 55. Variegated Kale Selected, sent by Messrs. Barr, and recommended as a decorative variety.

Other Exhibits.

Mr. J. Leeder, Postwick : Apple 'Leeder's Perfection.'
 W. G. Rigden, Esq., Englefield Green : Potatos and Onion 'Royal Keeper.'

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FRUIT AND VEGETABLE COMMITTEE, APRIL 8, 1919.

Mr. C. G. A. NIX in the Chair, and eleven members present.

Award Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Sutton, Reading, for vegetables.

FRUIT AND VEGETABLE COMMITTEE, APRIL 29, 1919.

Mr. C. G. A. NIX in the Chair, and eleven members present.

There were no exhibits before the Committee on this occasion.

FLORAL COMMITTEE.

JANUARY 14, 1919.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-seven members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. May, Upper Edmonton, for ferns and Cyclamen.

Silver Banksian Medal.

To Messrs. Low, Enfield, for Carnations.

To Mr. G. W. Miller, Wisbech, for hardy plants.

To Messrs. Piper, Langley, for shrubs and alpinists.

Bronze Banksian Medal.

To Mr. G. Reuthe, Keston, for hardy plants.

First-class Certificate.

To *Cotoneaster serotina* (votes 11 for, 4 against), from the R.H.S. Gardens, Wisley. A very useful ornamental shrub from China growing from 4 to 6 feet high and of graceful habit. The leaves are ovate, apiculate, from 1½ to 2 inches long and nearly an inch broad. They have prominent midribs and the under sides are glaucous. The small, round, scarlet fruits are borne in corymbs along the long arching branches of the plant.

Other Exhibit.

R.H.S. Gardens, Wisley: *Pyracantha Gibbsii* to show the persistence of the fruits.

FLORAL COMMITTEE, JANUARY 28, 1919.

Mr. H. B. MAY, V.M.H., in the Chair, and fifteen members present.

Awards Recommended :—

Silver Flora Medal.

To R. L. Mond, Esq. (gr. Mr. C. Hall), Sevenoaks, for Primulas &c.

Bronze Flora Medal.

To Mr. G. W. Miller, Wisbech, for hardy plants.

To Messrs. Piper, Langley, for shrubs and hardy Cyclamen.

Bronze Banksian Medal.

To Messrs. Carter, Raynes Park, for *Primula malacoides*.

To Messrs. Felton, London, for Eucalyptus and Cytisus.

Award of Merit.

To *Primula malacoides* 'The President' (votes 12 for, 1 against), from Messrs. Carter, Raynes Park. A good, pale rosy-lilac, double form of this well-known greenhouse Primula.

Other Exhibits.

Messrs. Chapman, Rye: Freesias.

Misses Hopkins, Shepperton: hardy plants.

Mr. G. Reuthe, Keston: hardy plants.

Mr. Rosenheim, East Molesey: *Primula* 'Juliana.'

xl PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

FLORAL COMMITTEE, FEBRUARY 11, 1919.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Cheal, Crawley, for Conifers.

Silver Flora Medal.

To Messrs. Barr, Covent Garden, for Cyclamen.

Silver Banksian Medal.

To Mr. G. W. Miller, Wisbech, for hardy plants.

Other Exhibits.

Messrs. H. Chapman, Rye : Freesias.

Misses Hopkins, Shepperton : hardy plants.

Messrs. Low, Enfield : Carnations.

FLORAL COMMITTEE, FEBRUARY 25, 1919.

Mr. H. B. MAY, V.M.H., in the Chair, and thirteen members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Low, Enfield, for Carnations and Cyclamen.

To Messrs. May, Upper Edmonton, for ferns and flowering plants.

To Mr. L. R. Russell, Richmond, for stove plants.

Silver Banksian Medal.

To Mr. G. W. Miller, Wisbech, for Spring flowers.

To Messrs. Piper, Langley, for hardy plants.

To Mr. G. Reuthe, Keston, for rare Conifers.

Bronze Flora Medal.

To Messrs. H. Chapman, Rye, for Irises and Freesias.

Bronze Banksian Medal.

To Messrs. Cheal, Crawley, for hardy plants.

To Mr. G. G. Whitelegg, Chislehurst, for alpine.

Award of Merit.

To Freesia 'Merry Widow' (votes 16 for, 2 against), from Rev. J. Jacob, Whitechurch, Salop. A very large-flowered variety. The ground colour is white suffused with pale violet-lilac. The latter colour is also seen in the lines in the throat, and there is a patch of golden yellow on the lower segment of the flower. It is said to be a tall-growing variety and excellent as a pot plant.

To Freesia 'Rose Beauty' (votes unanimous), from Rev. J. Jacob, Whitechurch, Salop. A dainty variety of a very deep rose-pink colour. The white throat is lined with rose and the lower segment of the flower has a touch of gold when first opened. This variety is a great advance in colour.

To *Primula malacoides* 'Princess Patricia' (votes 20 for), from Messrs. Carter, Raynes Park. This variety of *Primula malacoides* is of good habit and very free-flowering. The flowers are rosy-mauve in colour and three-quarters of an inch or more in diameter.

Other Exhibits.

Messrs. Barr, London : hardy plants.

Misses Hopkins, Shepperton : hardy plants.

FLORAL COMMITTEE, MARCH 11, 1919.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-one members present.

Awards Recommended :—*Silver Flora Medal.*

To Messrs. Gill, Falmouth, for Rhododendrons and Arums.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. May, Upper Edmonton, for ferns and flowering plants.

To Messrs. Waterer, Sons & Crisp, Twyford, for alpinists.

Bronze Flora Medal.

To Messrs. Cheal, Crawley, for shrubs.

To Mr. G. W. Miller, Wisbech, for hardy plants.

To Messrs. Piper, Langley, for shrubs and alpinists.

To Messrs. Tucker, Oxford, for alpinists.

Bronze Banksian Medal.

To Messrs. Low, Enfield, for Carnations.

To Mr. G. Reuthe, Keston, for hardy plants.

Award of Merit.

To Freesia 'Daddy-long-legs' (votes unanimous), from Rev. J. Jacob, Whitchurch, Salop. The flowers of this charming Freesia are large, sweetly scented, and rosy-mauve in colour with a golden-orange blotch on the lower segment. The segments are somewhat reflexed, so that the blooms are much more open than usual. This variety is a very tall grower, hence its name.

Other Exhibits.

Messrs. Chapman, Rye : Freesia 'Opal.'

G. Ferguson, Esq., Weybridge : Freesias.

Misses Hopkins, Shepperton : hardy plants.

Mr. G. G. Whitelegg, Chislehurst : alpinists.

FLORAL COMMITTEE, MARCH 25, 1919.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-five members present.

Awards Recommended :—*Silver Flora Medal.*

To Messrs. Cuthbert, Southgate, for Azaleas.

To Messrs. Gill, Falmouth, for Rhododendrons &c.

To Messrs. Tucker, Oxford, for alpinists.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. May, Upper Edmonton, for ferns and flowering plants.

To Mr. G. Prince, Longworth, for Roses.

To Messrs. Waterer, Sons & Crisp, Twyford, for alpinists.

Bronze Flora Medal.

To Messrs. Piper, Langley, for shrubs and alpinists.

Bronze Banksian Medal.

To Mr. G. W. Miller, Wisbech, for Primroses.

To Messrs. Peed, West Norwood, for Cyclamen.

To Mr. G. Reuthe, Keston, for hardy plants.

Award of Merit.

To Freesia 'Pinkie' (votes 15 for, 4 against), from Rev. J. Jacob, Whitchurch, Salop. This variety represents a great advance in colour in Freesias. The

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shade is a good clear pink and the blooms are of medium size but not highly scented.

To *Saxifraga lilacina* (votes 18 for), from Messrs. Tucker, Oxford. A beautiful alpine species from the Himalaya. Its tiny foliage forms dense, grey-green tufts which are studded with the comparatively large rose-lilac flowers.

Other Exhibits.

Messrs. Cheal, Crawley : hardy plants.
Mr. J. Fitt, Welwyn : *Rhododendron Veitchianum*.
Misses Hopkins, Shepperton : hardy plants.
Messrs. Low, Enfield : Carnations.
P. Rosenheim, Esq., East Molesey : Primulas.
Mr. G. G. Whitelegg, Chislehurst : alpinas.

FLORAL COMMITTEE, APRIL 8, 1919.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-two members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Mr. E. J. Hicks, Twyford, for Roses.

Silver Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Messrs. Tucker, Oxford, for alpinas.

Silver Banksian Medal.

To Messrs. Cutbush, Barnet, for Carnations &c.
To Messrs. Low, Bush Hill Park, for Carnations.
To Messrs. May, Upper Edmonton, for ferns and flowering plants.
To Mr. G. W. Miller, Wisbech, for Polyanthus &c.
To Mr. G. Prince, Longworth, for Roses.
To Mr. L. R. Russell, Richmond, for Azaleas &c.

Bronze Flora Medal.

To Messrs. Piper, Langley, for alpinas.
To Mr. G. Reuthe, Keston, for hardy plants.
To R.H.S. Gardens, Wisley, for alpinas.

Bronze Banksian Medal.

To Misses Hopkins, Shepperton, for hardy plants.

Award of Merit.

To Freesia 'Bartley Mauve' (votes 21 for), from Mr. H. Dalrymple, Bartley, Southampton. A large-flowered, sweetly scented, violet-mauve variety of excellent form.

To Freesia 'Bartley Rose' (votes 19 for, 3 against), from Mr. H. Dalrymple, Bartley, Southampton. The flowers of this variety are large and of a rosy-mauve colour, which also runs in lines into the white tube.

To Freesia 'Goldfinch' (votes unanimous), from Mr. H. Dalrymple, Bartley, Southampton. A beautiful golden-yellow variety with a deep orange blotch on the lower segment. The flowers are of good size and sweetly scented.

To Primula 'Wanda' (votes 12 for), from Messrs. Baker, Codsall. This hybrid Primula is the result of a cross between *Primula juliae* and a crimson form of the common Primrose (*P. acaulis*). The plant has a neat and robust habit and the leaves are rounder and somewhat shorter than those of *P. acaulis*. The flowers which are borne in great abundance, are of a bright purplish-crimson colour with a golden eye, and they are of large size. This is the most striking of the many hybrids resulting from this cross so far exhibited.

Cultural Commendation.

To Miss C. Warner, Belle Orchard, Hawkhurst, for *Richardia africana*.

Other Exhibits.

Messrs. Cheal, Crawley : Primulas and hardy plants.
 Mrs. Lloyd Edwards, Ruabon : Saxifrages and hybrid Primula.
 Messrs. Paul, Cheshunt : Rhododendron 'Paul's Early Blush.'
 Mr. J. H. Wood, Boston Spa : Saxifraga 'Boston Spa Seedling.'

FLORAL COMMITTEE, APRIL 29, 1919.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-three members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
 To Messrs. Gill, Falmouth, for Rhododendrons.
 To Mr. L. R. Russell, Richmond, for Azaleas &c.

Silver Banksian Medal.

To Messrs. Cheal, Crawley, for flowering shrubs.
 To Messrs. Cuthbert, Southgate, for Azaleas.
 To Messrs. Low, Bush Hill Park, for Carnations &c.
 To Messrs. May, Upper Edmonton, for ferns and flowering plants.
 To Mr. G. W. Miller, Wisbech, for hardy plants.
 To Messrs. Piper, Langley, for alpinas.

Bronze Flora Medal.

To Adeline, Duchess of Bedford, Chenies, for Primula 'Eureka' hybrids.
 To Messrs. Cutbush, Highgate, for Carnations.
 To Mr. M. Prichard, Christchurch, for alpinas.
 To Mr. G. Reuthe, Keston, for hardy plants.
 To Messrs. Tucker, Oxford, for alpinas.
 To Miss C. Warner, Hawkhurst, for Arums.

Bronze Banksian Medal.

To Mr. J. Fitt, Welwyn, for *Rhododendron fragrantissimum*.
 To Misses Hopkins, Shepperton, for hardy plants.

Award of Merit.

To *Aubrietia rosea splendens* (votes 11 for), from Mr. M. Prichard, Christchurch. This useful addition to the Aubrietias has bright rose flowers measuring 1 inch across and is very free-flowering.

To *Rhododendron* 'Madame G. Verde Delisle' (votes 12 for, 3 against), from T. H. Lowinsky, Esq., Sunninghill. This variety is the result of a cross between *Rhododendron* 'Doncaster' and *R. Aucklandii*. The flowers which measure 4 inches across are a very bright deep-pink colour, and are borne in trusses of about eight blooms. The centre is lighter in colour and spotted with brown.

To *Rhododendron* 'Miss Adelaide Clow' (votes 11 for, 1 against), from T. H. Lowinsky, Esq., Sunninghill. The flowers of this variety are white flushed with pink and have a few chocolate spots on the upper segment. The blooms measure 4 inches across and are borne in trusses of about twelve. The buds are quite pink. This variety resulted from a cross between *Rhododendron* 'White Pearl' and *R. Aucklandii*.

To *Rhododendron* 'Mrs. Tom Lowinsky' (votes unanimous), from T. H. Lowinsky, Esq., Sunninghill. This magnificent variety was also raised by crossing *Rhododendron* 'White Pearl' and *R. Aucklandii*. Its flowers are very large, measuring 4½ inches across, white flushed with pink on the outside, flattish, and are borne in trusses of about eight.

To *Rhododendron* 'Xenia' (votes 9 for, 1 against), from T. H. Lowinsky, Esq., Sunninghill. The parents of this variety are *Rhododendron* 'Helen Schiffner' and *R. Mrs. Charles Butler*. The flowers are 3 inches across, white with crimson lines at the base, and are borne in trusses of about twelve.

Other Exhibits.

Miss Bayne, Bridge of Allan : Clematis 'Miss Bayne.'
 Mr. C. Elliott, Stevenage : Primula 'Mrs. Wilson.'
 Messrs. Godfrey, Exmouth : strain of *Schizanthus*.
 Messrs. Paul, Cheshunt : Rhododendrons.

ORCHID COMMITTEE.

JANUARY 14, 1919.

Sir JEREMIAH COLMAN, Bart., in the Chair, and twenty-three members present.

Awards Recommended :—

Gold Medal.

To Messrs. Charlesworth, Haywards Heath, for a group.

Silver-gilt Flora Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for hybrid *Odontoglossums* and *Odontiodas*.

Silver Flora Medal.

To Messrs. McBean, Cooksbridge, for *Cymbidiums* and other hybrids.

To Messrs. Stuart Low, Jarvisbrook, for *Laeliocattleyas* and *Sophrocattleyas*.

Silver Banksian Medal.

To Messrs. Cypher, Cheltenham, for hybrid *Cypripediums*.

Award of Merit.

To *Cypripedium* × 'Perseus' ('Lady Dillon' × 'Alcibiades illustris') (votes unanimous), from W. R. Lee, Esq., Plumpton Hall, Heywood, Lancashire (gr. Mr. Branch). Dorsal sepal white with spotted lines of dark claret colour. Petals and lip brownish-rose with yellow margin.

Preliminary Commendation.

To *Odontoglossum* × 'Princess Patricia' ('Dora' × *crispum* 'Luciani') (votes 16 for, 0 against), from Messrs. Armstrong & Brown. Inner two-thirds of the segments blotched dark Indian red, the rest white.

To *Odontoglossum* × 'Triumph' (*ardentissimum* × *Ossulstonii*) (votes 18 for, 0 against), from Messrs. Armstrong & Brown. A fine blush-white seedling heavily blotched with claret-red.

Other Exhibits.

Sir Jeremiah Colman, Bart.: *Laeliocattleyas*.

G. W. Bird, Esq.: *Odontioda* × 'The Sphinx' (parentage unrecorded).

Baron Bruno Schroeder: *Brassocattleya* × *Cliftonii* 'albans'.

E. R. Ashton, Esq.: *Sophrolaeliocattleya* × 'Isabella.'

Messrs. Flory & Black: *Odontoglossums*.

Messrs. Sanders: *Cymbidium* × 'Atalanta.'

ORCHID COMMITTEE, JANUARY 28, 1919.

Sir JEREMIAH COLMAN, Bart., in the Chair, and twelve members present.

Awards Recommended :—

Gold Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for over one hundred specimens of hybrid *Cymbidiums*, *Calanthes*, *Odontiodas*, and *Odontoglossums*.

Silver Flora Medal.

To Messrs. Charlesworth, Haywards Heath, for hybrids.

Award of Merit.

To *Odontoglossum* × *ardentissimum* 'Reine Blanche' (*crispum* 'xanthotes' 'Pescatorei album') (votes unanimous), from Dr. Craven Moore, Victoria Park.

Manchester. Flowers large, pure white with a few straw-yellow spots on the lip.

Other Exhibits.

Frederick J. Hanbury, Esq.: three hybrid *Cypripediums*.
 Dr. Miguel Lacroze: *Cypripedium* × 'Isonzo' *Bryadir* variety.
 Baron Bruno Schröder: *Cypripedium* × 'Eurybiades' Helmuth.
 Mrs. Norman Cookson: *Cypripedium* × 'Oakwood Giant.'
 Messrs. Flory & Black: *Sophrocattleyas*.
 Messrs. McBean: hybrid *Cattleyas*.

ORCHID COMMITTEE, FEBRUARY 11, 1919.

Sir JEREMIAH COLMAN, Bart., in the Chair, and thirteen members present.

Awards Recommended:—

Award of Merit.

To *Odontoglossum* × 'Gatton Emperor' var. 'Tiberius' (*Lambeauianum* × hybrid unrecorded) (votes unanimous), from Sir Jeremiah Colman, Bart., Gatton Park, Surrey (gr. Mr. Collier). A darker violet-purple variety of the type which was given an Award of Merit, February 12, 1918.

To *Odontoglossum* × 'Empire' (*eximium* × 'Marathon') (votes 10 for, 0 against), from Messrs. Armstrong & Brown, Orchidhurst, Tunbridge Wells. Flowers large, blotched with claret-red on white ground.

To *Odontoglossum crispum* 'The Marquis' (votes 9 for, 0 against), from Messrs. Charlesworth, Haywards Heath. A home-raised seedling of good quality, pure white, petals and lip fringed.

To *Odontoglossum* × 'Radiant' ('Dora' × 'Alexandra') (votes 10 for, 0 against), from Messrs. Charlesworth. Flower of *O.* × 'Jasper' type; large, rose finely marked with dark claret.

To *Odontoglossum* × 'St. George' (*eximium* × 'Alexandra') (votes 8 for, 0 against), from Messrs. Charlesworth. A fine flower with white ground, blotched with dark mauve.

To *Brassolaeliocattleya* × 'Imogen' (*B.-c.* × *langleyensis alba* × *L.-c.* × 'Trimyra') (votes 7 for, 0 against), from Messrs. Flory & Black, Slough. Flowers of *Cattleya* form, white with yellow disc and fringed margin to the lip.

Cultural Commendation.

To Mr. Farnes, Orchid Grower to Pantia Ralli, Esq., Ashted Park, for *Cymbidium* × *Gottianum* (*insigne* × *eburneum*) with six spikes, bearing together twenty-five flowers.

Other Exhibits.

Messrs. Armstrong & Brown: new *Odontoglossums* and *Odontiodas*.

Messrs. Charlesworth: rare hybrids.

Messrs. Flory & Black: new *Odontoglossums*.

Messrs. Sanders: hybrids and rare species.

Baron Bruno Schröder: varieties of *Cypripedium* × 'Eurybiades.'

ORCHID COMMITTEE, FEBRUARY 25, 1919.

Sir HARRY J. VEITCH in the Chair, and nineteen members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for hybrid *Cymbidiums*, *Odontoglossums*, and *Odontiodas*.

To Messrs. Charlesworth, Haywards Heath, for *Cattleyas*, *Laeliocattleyas*, and *Odontoglossums*.

Silver Flora Medal.

To Messrs. Stuart Low, Jarvisbrook, Sussex, for hybrids and rare species.

Silver Banksian Medal.

To Messrs. McBean, Cooksbridge, for hybrid Cymbidiums and Odontoglossums.
To Messrs. Hassall, Southgate, for hybrid Cymbidiums.

First-class Certificate.

To *Brassocattleya* × 'Princess Patricia' (C. × 'Enid' × B.-c. × *Cliftonii* *magnifica*) (votes unanimous), from Messrs. Charlesworth. A fine flower with the features of the *Brassocattleya* parent. Sepals and petals light rose colour; lip Tyrian purple in front; disc chrome-yellow.

Award of Merit.

To *Laeliocattleya* × 'Zeno' var. 'Lyoth' (L.-c. × 'St. Gothard' × C. × *Luegeae*) (votes 14 for, 0 against), from Messrs. Charlesworth. A large and well-formed rose flower with rich purple lip, having gold lines from the base.

To *Cymbidium* × 'International' (*eburneo-Lowianium* × *Woodhamstanum*) (votes 11 for, 0 against), from Messrs. Armstrong & Brown. Flowers large and of fine substance; primrose-yellow with purple spotting on the lip.

To *Cymbidium* × *albanense*, McBean's var. (*erythrostylum* × *insigne*) (votes 13 for, 0 against), from Messrs. McBean. Flowers blush-white with purple dotted lines on the lip.

To *Laeliocattleya* × *Rex* (L.-c. × *Haroldiana* × C. 'Tityus Rex') (votes unanimous), from Messrs. Flory & Black, Slough. A large and showy hybrid with broad, crimped sepals and petals of rosy-mauve colour; lip ruby-purple with yellow disc and basal lines.

Cultural Commendation.

To Mr. J. Collier, gr. to Sir Jeremiah Colman, Bt., for *Cymbidium* × *Lowio-grandiflorum*, with a spike of twenty-nine flowers.

Other Exhibits.

Sir Jeremiah Colman, Bt.: *Odontoglossum* × 'Gatton Princess.'

Dr. Miguel Lacroze: *Laeliocattleya* × 'Beatrice' var. 'Roehampton.'

Sir Mervyn Buller: *Cattleya* × 'Clotho,' and *C. Trianae* *alba*.

Messrs. Flory & Black: hybrids.

ORCHID COMMITTEE, MARCH 11, 1919.

Sir JEREMIAH COLMAN, Bt., in the Chair, and twenty members present.

Awards Recommended :—

Silver Flora Medal.

To Sir Jeremiah Colman, Bt., Gatton Park (gr. Mr. Collier), for hybrid Dendrobiums and rare species.

To A. C. Feaver, Esq., South Norwood (gr. Mr. Rodgers), for hybrid Cymbidiums.

To Messrs. Armstrong & Brown, Tunbridge Wells, for *Odontiodas* and new *Odontoglossums*.

To Messrs. Charlesworth, Haywards Heath, for hybrid *Odontoglossums* and *Laeliocattleyas*.

To Messrs. McBean, Cooksbridge, for Cymbidiums and other hybrids.

Silver Banksian Medal.

To Messrs. Stuart Low, Jarvisbrook, for *Laeliocattleyas* and *Sophronitis* crosses.

First-class Certificate.

To *Brassocattleya* × 'Gatton Lily' var. 'Purity' (C. *Trianae* *albans* × B.-c. × *Digbyano-Mendelii* var. 'Fortuna') (votes unanimous), from Sir Jeremiah Colman, Bt. A fine pure white variety of the original which was given a F.C.C. December 3, 1918.

Award of Merit.

To *Odontoglossum* × 'Philomene' var. 'Mauretania' (*Rolfeae majesticum* × *percultum* 'Olympia') (votes unanimous), from Messrs. Charlesworth. Flower large, pale yellow, blotched with purple. Lip broad as long, flat, white with purple spotting at the base.

To *Odontoglossum* × 'Pyramus' ('Louise' × 'l'Empereur') (votes 17 for, 0 against), from Messrs. Charlesworth. Flower of good shape, white, heavily blotched with reddish-claret colour.

To *Odontoglossum* × 'Peerless' *auriferum*. Rosslyn var. (*Ossulstonii* × *eximium*) (votes 17 for, 0 against), from H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Thurgood). Ground colour pale yellow with chocolate blotches.

Preliminary Commendation.

To *Odontioda* × 'Lady Patricia Ramsay' (*Odm.* × *Lambeauianum* × *Oda.* × 'Coronation') (votes 17 for, 0 against), from Messrs. Armstrong & Brown. Flower of good size and shape, heavily blotched with bright red.

To *Odontoglossum* × 'General Foch,' Orchidhurst var. (*Armstrongiae* × 'Colossus') (votes 17 for, 0 against), from Messrs. Armstrong & Brown. Sepal and petals white, heavily blotched with purplish-red.

Other Exhibits.

Pantia Ralli, Esq.: *Sophrolaeliocattleya* × 'His Majesty,' Ralli's variety.
Messrs. Flory & Black: *Sophrontis* hybrids and *Odontoglossums*.
H. S. Goodson, Esq.: *Odontoglossum* × *Goodsonianum* (*Rossii* × ?).

ORCHID COMMITTEE, MARCH 25, 1919.

Sir JEREMIAH COLMAN, Bt., in the Chair, and eighteen members present.

*Awards Recommended:—**Silver Flora Medal.*

To Messrs. Charlesworth, Haywards Heath, for hybrid Orchids.

Silver Banksian Medal.

To Messrs. Stuart Low, Jarvisbrook, Sussex, for *Cattleyas* and *Laeliocattleyas*.
To Messrs. McBean, Cooksbridge, Sussex, for *Cymbidiums* and *Laeliocattleyas*.
To Messrs. Sander, St. Albans, for *Odontiodas* and *Odontoglossums*.

Award of Merit.

To *Laeliocattleya* × 'Lady Evelyn' (*L.-c.* × 'Goldfinch' × *C.* × 'Empress Frederick') (votes unanimous), from Sir Jeremiah Colman, Bt. (gr. Mr. J. Collier). In shape resembling the *Cattleya* parent. Sepals and petals rose; lip ruby-purple with yellow disc and basal lines.

To *Odontioda* × 'St. André' (*Oda.* × *Sanderae* × *Odm.* × *amabile*) (votes unanimous), from Messrs. Sander. Ground colour pale yellow effectively blotched with bright red.

To *Odontoglossum* × 'Vardar' (*mirificum* × *eximium*) (votes 15 for, 0 against), from Messrs. Flory & Black, Slough. Flowers white heavily blotched with claret-red, the broad white margin being clearly defined.

Preliminary Commendation.

To *Odontoglossum* × 'Pallas' (*illustrissimum* × 'Doris') (votes 15 for), from Messrs. Flory & Black. Flower closely blotched with dark purple, the white ground showing between the blotches.

To *Odontioda* × 'Marvel' (*Oda.* × *Bradshawiae* × *Odm.* × 'Mars') (votes 9 for, 3 against), from Messrs. Armstrong & Brown. A finely formed crimson flower with slight white margin.

Other Exhibits.

Sir Jeremiah Colman, Bt.: hybrid *Dendrobiums*.
Messrs. Armstrong & Brown: new *Odontiodas* and *Odontoglossums*.
E. R. Ashton, Esq.: hybrid *Odontoglossums* and *Odontiodas*.
H. T. Pitt, Esq.: *Miltonia* × *Bleuana*, Hessle variety.
Messrs. Flory & Black: *Odontoglossums*.

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ORCHID COMMITTEE, APRIL 8, 1919.

Sir JEREMIAH COLMAN, Bt., in the Chair, and twenty-one members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Armstrong & Brown, Orchidhurst, Tunbridge Wells, for hybrids, including new *Odontiodas* and *Odontoglossums*.

To H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Thurgood), for hybrids and interesting species.

To Messrs. Charlesworth, Haywards Heath, for hybrids and new *Odontoglossums*.

Silver Banksian Medal.

To Messrs. McBean, Cooksbridge, for *Cymbidiums*, *Odontoglossums*, and *Odontiodas*.

Award of Merit.

To *Odontioda* × 'Gladys' *superba* (*Odm. Pescatorei* × *Oda.* × *Bradshawiae*) (votes unanimous), from Dr. Craven Moore, Victoria Park, Manchester. A showy flower, with white ground effectively marked with red.

To *Odontioda* × 'Margaret,' Gatton Park var. (*Oda.* × *Bradshawiae* × *Odm. ardentissimum*) (votes unanimous), from Sir Jeremiah Colman, Bt., Gatton Park, Surrey (gr. Mr. Collier). Flower of good size and shape, mahogany-red with a light violet shade and slight white markings at the margin.

To *Milionia* × 'Venus' Orchidhurst var. (*vexillaria* × *Phalaenopsis*) (votes unanimous), from Messrs. Armstrong & Brown. Flowers as large as those of *M. vexillaria*. Sepals and petals pale lilac. Lip white with spotted lines of ruby red extending from the yellow base to the centre.

Cultural Commendation.

To Dr. Craven Moore, for *Odontioda* × 'Gladys' *superba* with two spikes bearing together fifty-four flowers.

Other Exhibits.

Sir Jeremiah Colman, Bt.: fine forms of *Lycaste Skinneri*.

Col. Stephenson R. Clarke, Cuckfield: *Lowara* × 'Paul' (*Sophrolaelia* × *Psyche* × *Brassolaelia* × 'Mrs. M. Gratrix').

C. J. Lucas, Esq.: *Laeliocattleyas* and *Odontoglossums*.

ORCHID COMMITTEE, APRIL 29, 1919.

Sir HARRY J. VEITCH in the Chair, and fifteen members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Messrs. Armstrong & Brown, Orchidhurst, Tunbridge Wells, for hybrid *Odontoglossums* and *Odontiodas*.

To Messrs. Charlesworth, Haywards Heath, for a group.

Silver Flora Medal.

To Messrs. Stuart Low, Jarvisbrook, Sussex, for *Cattleyas* and *Laeliocattleyas*.

Silver Banksian Medal.

To H. T. Pitt, Esq., Rosslyn, Stamford Hill, for hybrids and rare species.

To E. R. Ashton, Esq., Tunbridge Wells, for *Odontoglossums*.

To Messrs. McBean, Cooksbridge, for a group.

First-class Certificate.

To *Odontioda* × 'Lady Veitch' (*Oda.* × *Cooksoniae*, Orchidhurst var. × *Odm.* × 'Mars') (votes unanimous), from H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Thurgood). A superb hybrid with flower four inches across and

of perfect shape. Sepals and petals Indian Red with a gold shade. Lip white, with a ruby-red blotch in front of the yellow crest. The variety was raised by Messrs. Armstrong & Brown.

Award of Merit.

To *Odontoglossum* × 'The Tiger' (*Lawrenceanum* × 'Stella') (votes unanimous), from H. T. Pitt, Esq. The largest of the *O. triumphans* class, that species being in both parents. Ground colour yellow heavily blotched with red-brown.

To *Odontoglossum* × *Ashtonii* (*amabile* × hybrid unrecorded) (votes unanimous), from E. R. Ashton, Esq., Broadlands, Tunbridge Wells. Flower large, white with the inner two-thirds of the segments blotched with dark purple.

To *Odontoglossum* × 'Radiant' var. 'Marion' ('Dora' × 'Alexandra') (votes 7 for, 3 against), from Messrs. Flory & Black, Slough. Flower violet-purple with blush-white blotches at the tips and margin.

To *Cattleya* × 'Rajah' ('Enid' × 'Empress Frederick') (votes 10 for, 2 against), from Messrs. Stuart Low, Jarvisbrook, Sussex. Resembling the parents but with a reversion towards the *C. Warscewiczii* in *E.* × 'Enid.' Flowers rose colour with large crimson lip.

Preliminary Commendation.

To *Odontioda* × 'Signor Orlando' (*Odm.* × 'Jasper' × *Oda* × *Bradshawiae*) (votes unanimous), from Messrs. Armstrong. Margins of the segments violet, inner halves white with claret markings.

Other Exhibits.

Sir Jeremiah Colman, Bt. : new hybrids and *Dendrobium* flowers.

Mrs. Norman C. Cookson : hybrid *Odontoglossums* and *Odontiodas*.

Pantia Ralli, Esq. : *Odontoglossum crispum aureum*.

C. J. Lucas, Esq. : *Brassocattleya*.

Messrs. Flory & Black : *Odontoglossums*.

Messrs. Sander : *Odontoglossums* and scarlet *Odontiodas*.

R.H.S. EXAMINATIONS IN HORTICULTURE.

GENERAL EXAMINATION, 1919.

SENIORS.

ONE HUNDRED AND NINETEEN candidates presented themselves for the Senior General Examination. Of these sixteen, or fourteen per cent., were placed in the First Class; thirty-eight, or thirty-two per cent., were placed in the Second Class; forty-one, or thirty-four per cent., were placed in the Third Class; twenty-four failed to satisfy the Examiners.

The Examiners, Dr. A. B. Rendle, F.R.S., F.L.S., V.M.H., and Mr. James Hudson, V.M.H., report that the general standard of the answers was relatively much higher in the case of the Senior Candidates than in that of the Juniors, even after making due allowance for the difference in ages. Although there was a marked improvement in the direction of conciseness, there were cases in which the explicit instruction printed on the Question Paper was ignored. This only too frequently resulted in irrelevant and inadequate answers. For example, as an answer to the last question on "improvement by selection," which has been practised from time immemorial by gardeners, a detailed account of the discoveries of Mendel was not required; and those answers which were confined thereto were consequently far from adequate.

In many cases the Examiners were pleased to notice a good knowledge of experimental plant physiology. On the other hand, good line drawings were markedly absent; indeed, throughout the whole range of answers, a clear, well-executed line drawing was rarely found. In future years it is the intention of Examiners to expect neatly drawn, clear and accurate drawings to illustrate the answers given.

JUNIORS.

There were forty-seven candidates in the Junior Section. Of these six or thirteen per cent., obtained a First Class; twelve, or twenty-five per cent., obtained a Second Class; thirteen, or twenty-eight per cent., obtained a Third Class, and fifteen failed to satisfy the Examiners. One candidate did not present himself.

The Examiners report that there was evidence of very inadequate teaching at some centres. In Question 3, many candidates missed the point, viz., the loss of water by the leaves of the plant due to excessive transpiration; the answers were more frequently than not confused with direct loss from the soil by evaporation.

The necessity for good drawings in the Junior Section was also manifest; hardly any candidate was able to make a good drawing of a flower in vertical section.

April 1919.

W. WILKS, *Secretary*.

SENIORS.

Class I.

1. Johns, T. D., Cartref, Bryn Road, Tondu, nr. Bridgend.
2. Cook, T. E., 6 Lawson Terrace, Newcastle, Staffs.
3. Gibson, C. M., Home Mead, Frith Road, Newbury.
4. Jones, Miss K. L., Glyn-cerrig, Mumbles, S. Wales.
5. Hazell, Miss M., Thatcham Fruit and Flower Farm, Newbury.
6. Ormston, Miss E., Thatcham Fruit and Flower Farm, Newbury.
7. Hird, R. W., 10 Roker Park Road South, Sunderland.
8. Jameson, Miss E. W., Avondale, Rainsford Avenue, Chelmsford.
9. Warburg, Miss W., Nantyderry Training Centre, nr. Abergavenny, Mon.
10. Pugh, Miss E. C., 21 Broadlands Road, Highgate, N.
11. Colc, W. E., Dyrham, Staple Hill, Bristol.
12. Davis, Miss W. M., 17 Fawley Road, W. Hampstead, N.W.6.
13. Surman, Miss N., Nantyderry Training Centre, nr. Abergavenny.

14. { Brockhouse, Miss D., Studley College, Warwickshire.
 { Rowe, R. J., Gretton, Church Stretton, Salop.
 { Youatt, Miss N., School of Gardening, Clapham, nr. Worthing, Sussex.

Class II.

1. { Hare, Miss K. C., Aldersey Hall, Horticultural College, nr. Chester.
 { Turner, Miss M., Brinkworth, Stapleton, Bristol.
 3. Tazewell, Miss K. M., St. James' Gardens, West Malvern, Worcs.
 4. Shaw, Miss A., Thatcham Fruit and Flower Farm, Newbury, Berks.
 5. { Campion, Miss P. M., Studley College, Studley, Warwickshire.
 { Ward, Miss I. W., University College, Reading.
 { Boyle, The Lady Helen, The Homestead, Meopham, Kent.
 { Hudson, C. E., 10 Fairfield Road, Chelmsford, Essex.
 7. { Macdonald, Miss J. Macleod, Aldersey Horticultural College, nr. Chester.
 { Procter, Miss C., St. Paul's Girls' School, Brook Green, Hammersmith.
 { Scholefield, Miss K., Horticultural College, Studley, Warwickshire.
 { Griffiths, R. P., St. Edmund's School, Crickhowell, S. Wales.
 12. { Heywood, Miss M. D. E., Thatcham Fruit and Flower Farm, Newbury,
 Berks.
 { Bentham, Miss M., 8 Thorn Road, Bournville, Birmingham.
 14. { Hilliard, Miss N., St. Gatien's School of Gardening, Rathfarnham, Co.
 Dublin.
 { Brockhouse, Miss K. E., Studley Horticultural College, Studley, Warwickshire.
 { Johnson, Miss L., Studley College, Studley, Warwickshire.
 16. { Nicolls, Miss E. C., 6 Summer Terrace, Onslow Gardens, S. Kensington.
 { Reilly, Miss D. K., Studley College, Studley, Warwickshire.
 { Stanley, Miss J., Culworth, Banbury.
 21. { Howells, J., Maeslan, Tonteg, Pontypridd, Glam.
 { Vale, Miss K. A., Thatcham Fruit and Flower Farm, nr. Newbury, Berks.
 23. { Gray, Miss E. W., Northgate Bungalow, Rottingdean, Sussex.
 { Peyton, Miss C. E., Studley College, Studley, Warwickshire.
 { Baker, F., 20 Cwmdare Street, Cathays, Cardiff.
 25. { Dickens, Miss A. M., Singlesole, Thorney, Peterborough.
 { Morris, Miss A. W., Thatcham Fruit and Flower Farm, Newbury, Berks.
 { Barton, Miss E. O., School of Gardening, Clapham, nr. Worthing.
 28. { Benest, Miss E. L., Thatcham Fruit and Flower Farm, Newbury, Berks.
 { Broadbent, Miss K. M., Huntsmoor Park, Iwer, Bucks.
 { Hawkins, F., Chyreen, Rosemount Estate, Romford.
 { Hedger, B. J., The Gardens, Tredegar Park, Newport, Mon.
 32. { Pearson, A. J., R.H.S. Gardens, Wisley, Surrey.
 { Sharpe, Miss R. M., Huntsmoor Park, Iwer, Bucks.
 { Chattaway, A., 54 Wellington Road, S. Ealing, W. 5.
 35. { Davies, Ray, Nantyderry Training Centre, Abergavenny, Mon.
 { Hill, Miss M. W., Balmayock, Perth, Scotland.
 { Rosencrantz, Miss V., Thatcham, Berkshire.

Class III.

1. { Amos, J., The Hollies, High Street, East Malling, Kent.
 { Butcher, Miss A. M., West Woodhay, Newbury, Berks.
 3. Barchelor, Miss M. W., Studley College, Studley, Warwickshire.
 { Clarke, Miss K. A., 72 Bridport Place, N. 1.
 4. { Davies, D., 5 Hill Street, Hendreforgan, Giffach Goch.
 { Morgan, Miss B., Studley College, Studley, Warwickshire.
 { Witt, A. W., Broomfield, Offham Road, West Malling, Kent.
 8. { Martin, Miss E. R., 14 Hartford Road, Davenham, nr. Northwich,
 Cheshire.
 { Chatterley, W. M., School House, Harvington, Evesham.
 { Cran, Miss L., Thatcham Fruit and Flower Farm, Thatcham.
 9. { Green, Miss D. K., Plas Newydd Gardens, Llanfair P.G., Anglesey.
 { Tucker, Miss L. G., 8 Fernleigh Road, Winchmore Hill, N. 21.
 { Vallance, F. H., Weston Park Gardens, nr. Stevenage, Herts.
 { Pearson, W. R., R.H.S. Gardens, Wisley, Ripley, Surrey.
 14. { Riddell, Miss I. C., 28 Kempeford Gardens, Earl's Court, S.W. 6.
 { Wagstaff, P. E., The Cottage, Bushey Hall Road, Bushey, Herts.

iii PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

- (Dagnall, Miss D., 48 King's Road, Willesden Green, N.W.
- (Mead, Miss A. A., Horticultural College, Studley, S.O., Warwickshire.
17. (Smith, Miss M. H., Shelton Cottage, Chestnut Avenue, Oulton Broad, Lowestoft.
- (Ratcliffe, Miss J., 24 Elizabeth Street, Nelson, Lancs.
- (Campbell, Miss P., Priory Side, Tottenham, N. 17.
21. (Jones, Miss G., Adam's Row, Scorrier, Cornwall.
- (Rushton, Miss V. M., Plas Newydd Gardens, Llanfair P.G., Anglesey,
- (Brown, B. B., Avondale, Rainsford Avenue, Chelmsford.
24. (Stuart-Menteth, Miss O., Studley College, Warwickshire.
- (Bagnall, Miss E. A., 42 Harrington Street, Dublin.
26. (Clark, Miss M. A., St. James' Gardens, West Malvern.
- (Hargreaves, J., The Gardens, The Whins, Sabden, nr. Blackburn.
- (Cruikshank, Miss H., Thatcham Fruit and Flower Farm, nr. Newbury.
- (FitzGerald, Miss M. O., St. Gatten's School of Gardening, Rathfarnham Co. Dublin.
29. (Gracie, Miss D. F., Studley College, Studley, Warwickshire.
- (Turrell, Miss M. A., Avondale, Rainsford Avenue, Chelmsford.
- (Adams, Miss D. P., Hillside, Barming, nr. Maidstone, Kent.
33. (Hailett, Miss J. E., 3 Logan Road, Bishopston, Bristol.
- (Dyke, Miss D. E. L., Eastfield, Flax Bourton, nr. Bristol.
- (Garnett, Rayne, 26 West Hill, Highgate, N. 6.
- (Gosselin, Miss E., 28 Aberdeen Road, Cotham, Bristol.
- (Otton, Miss J. M. H., 28 Old Fillebrook Road, Leytonstone, E. 11.
39. (Jensen, Miss D. H., Oaklands, East Farleigh, nr. Maidstone, Kent.
- (Daniell, Miss A. C., 14 Downs Park West, nr. Bristol.
40. (Moore, Miss E. A., Buckland Cop, nr. Betchworth, Surrey.

JUNIORS.

Class I.

1. Gill, Miss M., Aldersey Hall Horticultural College, Handley, nr. Chester.
2. Piper, E. W., The Lawns, Usk, Mon.
3. Nott, Miss E. M., 51 Apsley Road, Clifton, Bristol.
4. Paton, R. A., The Lawns, Usk, Mon.
5. Shearn, S. J., The Lawns, Usk, Mon.
6. Anderson, E. W., Bradwall Training School, Holmes Chapel, Cheshire.

Class II.

1. Stenning, R. W., Bradwall Training School, Holmes Chapel, Cheshire.
2. Houghton, A., Bradwall Training School, Holmes Chapel, Cheshire.
- (Garrity, J., Bradwall Training School, Holmes Chapel, Cheshire.
- Hyde, H., Bradwall Training School, Holmes Chapel, Cheshire.
3. Thomas, H., Bradwall Training School, Holmes Chapel, Cheshire.
- (Thomas, W. S., Bradwall Training School, Holmes Chapel, Cheshire.
7. McLoughlin, W., Bradwall Training School, Holmes Chapel, Cheshire.
- (Campbell, C., Bradwall Training School, Holmes Chapel, Cheshire.
8. Jordan, E., Bradwall Training School, Holmes Chapel, Cheshire.
- (Ramsay, W. H. A., Bradwall Training School, Holmes Chapel, Cheshire.
11. Higginson, W., Bradwall Training School, Holmes Chapel, Cheshire.
12. Moseley, J. J., Bradwall Training School, Holmes Chapel, Cheshire.

Class III.

1. Redley, S. A., Bradwall Training School, Holmes Chapel, Cheshire.
- (Ayer, G. S., Bradwall Training School, Holmes Chapel, Cheshire.
2. Sanders, H., Bradwall Training School, Holmes Chapel, Cheshire.
4. Simmonds, S., Bradwall Training School, Holmes Chapel, Cheshire.
5. Aldred, G., Bradwall Training School, Holmes Chapel, Cheshire.
6. Webster, F. W., Bradwall Training School, Holmes Chapel, Cheshire.
7. Singleton, W. H., Bradwall Training School, Holmes Chapel, Cheshire.
8. Welling, R., Bradwall Training School, Holmes Chapel, Cheshire.
9. Piper, G. F., The Lawns, Usk, Mon.
10. Downham, A., Bradwall Training School, Holmes Chapel, Cheshire.
11. Ratcliffe, N., Bradwall Training School, Holmes Chapel, Cheshire.
- (Adam, D., Lostock Industrial School, Lostock Junction, Bolton, Lancs.
12. Cotterill, F., Industrial School, Lostock, Bolton.

TEACHERS' EXAMINATION IN SCHOOL AND COTTAGE
GARDENING.

HONOURS EXAMINATION.

APRIL 26 AND JUNE 27, 1919.

FIFTEEN candidates entered for the Teachers' Honours Examination. Of these eight satisfied the Examiners, whilst six failed, and one candidate did not present himself.

The examination comprised three parts—written, practical, and viva voce. The practical and viva voce examinations were held at the Society's Gardens at Wisley, Surrey.

The Examiners, Mr. F. J. Chittenden, F.L.S., V.M.H., Mr. C. R. Fielder, V.M.H., and Mr. C. W. Mayhew, report that in the practical part the best work was done on the ground, that with fruit was generally fair, but the indoor work was poor. The tests by which manures may readily be distinguished were not known, nor was the descriptive work good.

Candidates who have secured the certificate this year may next year take any other section than that in which they have passed, if they wish to do so. Passes in additional sections will be endorsed on the original certificate.

The Examination is divided into the following sections :

(a) General Horticulture as applicable to School and Cottage Gardens.

(b) Fruit-growing in the open.

(c) Vegetable-growing in the open, or with only the most simple protective aids.

(d) Diseases and pests.

The following candidates secured the "Honours" Certificate, namely :

Section A, General Horticulture.

Baker, W. H., 75 Mitchell Street, Clowne, Chesterfield.
Chatterley, W. Morley, School House, Harvington, Evesham.
Harris, James A., 9 Glasgow Street, St. James, Northants.
Rowe, R. J., Gretton, Church Stretton, Salop.
Sharman, H., 29 Sandringham Road, Northampton.
Squire, Miss E. A., Training College, Norwich.
Sterne, H. H., Hundon, Clare, Suffolk.

Section B. Fruit-growing in the Open.

Cole, W. E., Dyrham, Staple Hill, Bristol.

W. WILKS, *Secretary.*

PRELIMINARY EXAMINATION.

APRIL 26, 1919.

THREE hundred and sixty-two candidates entered for the Preliminary Examination held on April 26, 1919. Of these 14 obtained a first class, 84 a second, and 157 a third, leaving 78 failures, and 29 absentees.

The Examiners, Mr. F. J. Chittenden, F.L.S., V.M.H., Mr. E. R. Janes, Mr. C. R. Fielder, V.M.H., Mr. C. W. Mayhew, and Mr. C. Wakely, report that, except in Question 6, there were few really good answers. For the most part they were vague, and in many cases the Examiners were led to doubt the extent of a candidate's knowledge of practical horticulture. The following are some of the criticisms of the Examiners :

Speaking generally, candidates still disregard the wording of the questions.

A large number either failed entirely to understand the simpler facts of food-making, or, by means of simple experiments suitable for children of school age, to demonstrate the part that the green leaf plays in the making of the plant's food.

Many candidates confused the terms "tillage" and "tilth."

The methods of improving heavy land by ridging and draining and the application of lime and littery manure, were generally understood, but many answers were of such length that candidates had not time to deal with light soils adequately.

It was remarkable how few of the candidates associated deep-working with the improvement of light soils, though the value of humus-forming material and surface cultivation in summer was appreciated. It was in respect to the chemical improvement of soils that the scantiest information was offered.

In reply to question 3, few candidates realized the danger of the spread of disease amongst overcrowded plants.

The difficulty of obtaining seeds from certain plants was not understood. Many fell into the common error of stating that "plants raised from cuttings are stronger and healthier than those raised from seeds."

A fairly good idea of the principles of cropping was shown, but the frequent appearance of a plan which had evidently been memorized from a text-book, rather than an original individually thought-out scheme, was disappointing. The principles of rotation were, on the whole, well understood, but their application to the plan was weak.

The "principles" of grafting were not understood. In question 9 there was a general lack of clearness as to the control of transpiration and too much stress was laid on the use of chemical manures.

July 1, 1919.

W. WILKS, *Secretary*.

First Class.

1. Lomax, J. W., School House, Painscastle, Erwood, S.O., Brecons.
2. Davies, T. G., 1 Cross Street, Pontardulais, Glam.
3. Mitchell, Miss G., 1 North Road, Brightlingsea, Colchester.
4. Harris, M. O'Brien, 4 Graham Road, London, E. 8.
5. Athersmith, A. E., Casson Gardens, Ulverston, Lancs.
6. Melhuish, R. W., 10 Alfred Street, Taunton, Som.
7. Pugh, Miss E. C., 21 Broadlands Road, Highgate, London, N.6.
8. Jones, T. L., 33 Robert Road, Handsworth, Birmingham.
9. Whiting, R., Edenhurst, Beamish, co. Durham.
10. Ironside, R., The Schoolhouse, Madderty, Crieff, Perthshire.
11. Cary, A. Trew, 21 The Avenue, Yeovil, Som.
12. Griffin, M. J., St. Mary's Training College, Brook Green, Hammersmith, W.6.
13. Sanderson, J., 3 Prudhoe Villas, Alnwick, Northumberland.
14. Joyce, A. A., Ivy House, Garrigill, Alston, Cumberland.

Second Class.

1. Huck, E. E., 42 Crocker Street, Newport, Isle of Wight.
2. Kerwood, H. C., Newerne, Lydney, Glos.
3. Ayers, J., 12 Belle Vue Road, Sunderland, co. Durham.
4. Harris, A. E., 4 Albany Road, Falmouth, Cornwall.
5. Houldsworth, G. E., "Ardrossan," Evesham Road, Stratford-on-Avon.
6. Ogden, F., 6 Lansdowne Avenue, Leigh-on-Sea, Essex.
7. Pendred, Miss R. I. M., Bradfield St. Clare, Bury St. Edmunds.
8. Ripley, L. E., 14 Temple End, High Wycombe, Bucks.
9. Underdown, Miss G. M., 24 Malton Street, Plumstead, S.E. 18.
10. Bracwell, W. A., Westroyd, Little Holcombe, Ramsbottom, Lancs.
11. Perkins, Miss M. E., 12 Norton Road, Letchworth, Herts.
12. Thomas, D. H., School House, Shrawley, Worcs.
13. Withers, Mrs. M. A., 128 Summergangs Road, Hull, Yorks.
14. Owen, D., 26 Bedw Road, Cilfynydd, Pontypridd.
15. Cartwright, B. S., 22 Sanctus Road, Stratford-on-Avon, Warwicks.
16. Flanders, W. P., 102 Osbaldeston Road, Stamford Hill, N. 16.
17. Herbert, T. E., 76 Schubert Road, Wandsworth, S.W. 15.
18. Parry, W. R., West View, Bacup, Lancs.
19. Hobson, J. E., 325 Barnsley Road, Pitsmoor, Sheffield.
20. Evans, Miss L. P., Blacklands School, Cavendish, Suffolk.
21. King, Miss M., Bramley House, Ashcott, nr. Bridgwater, Som.
22. Bell, Miss A. S., 2 South Esplanade, York.
23. Jagger, Miss L. C., 22 Chapel Street, Queensbury, Bradford.
24. Wiggins, W. A., 9 Park Road, Bedworth, nr. Nuneaton.
25. Chattaway, A., 54 Wellington Road, South Ealing, W. 5.
26. Randall, F. E., Lindonville, 398 Fulham Palace Road, S.W. 6.
27. Beckett, Miss C. O., c/o Mrs. Paxton, 22 Swift Street, Barnsley, Yorks.
28. Green, E. R., 8 Worbeck Road, Anerley, S.E. 20.
29. Hanchet, Miss H. E., Brent Eleigh School, nr. Lavenham, Suffolk.
30. Brooks, C. McColl, The Bungalow, Nether Stowey, Bridgwater, Som.
31. Mather, J. H., Laurieston School, Falkirk, Stirlingshire.
32. Clarke, Miss M. A., A.C.P., 28 Teddesley Street, Walsall.
33. Stephenson, J. W., School House, East Hedley Hope, Tow Law, co. Durham.
34. Glasson, A. L., School House, Long Wittenham, Abingdon, Berks.
35. Nicholas, W. A., 24 Dorset Road, Forest Gate, E. 7.
36. Oliver, W., Jubilee House, 6 Derby Street, Lincoln.
37. Roberts, Arnold J., 67 Chesterfield Road, Bristol.
38. Court, Miss P., 337 Romford Road, Forest Gate, E. 7.
39. Crow, A., 19 Primrose Cres., Fulwell, Sunderland.
40. Davis, E. G., 46 High Street, Lavenham, Suffolk.
41. Daws, Holly, 600 Fishponds Road, Bristol.
42. Jones, H. H., Shadow Moss School, Cheadle, Cheshire.
43. Rixham, J., Ainderby Steeple, Northallerton, Yorks.
44. Taylor, W. Y., 12 Carlton Terrace, Spennymoor, co. Durham.
45. Hough, F., The Schoolhouse, Corpusty, Norwich.
46. Nankivell, F. M., Chilsworth, Gunnslake, Tavistock, Devon.
47. Poulter, Miss I. D., 47 Lydhurst Avenue, Streatham Hill, S.W.

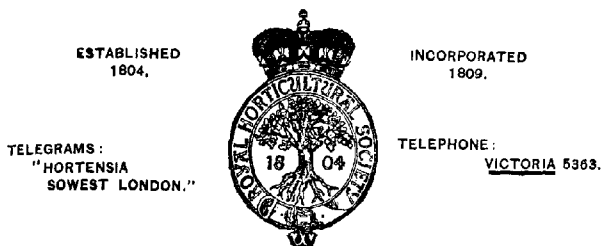
- Dewey, J. C., 44 Frensham Road, Southsea, Portsmouth.
- Kensett, Miss E. M., Post Office, Slaugham, Crawley, Sussex.
48. Rhys, T. B., New Hedges School, Tenby, S. Wales.
- Wilkinson, G., Dellcroft, Westcliffe Road, N., Roker, Sunderland.
52. Hopkins, E., 5 Cross Street, Pontardulais, Glam.
- Coe, Miss J. M., 24 Albert Street, Bury St. Edmunds.
53. Foster, Miss E. M., 27 Windmill Hill, Enfield.
- Morgan, D. J., Penybont, Borth, Cardiganshire.
- Procter, Miss C., St. Paul's Girls' School, Brook Green, Hammersmith, W. 6.
56. Williams, W. T., Blaenffos School, Pembs.
- Cowen, C. R., 3 Ellesmere Terrace, Roker, Sunderland.
58. Packer, Miss L., School House, Black Bourton, Clanfield, Oxon.
- Pearce, W. G., 80 Broad Street, Chesham, Bucks.
- Chatters, W. A., School House, Rougham, nr. Bury St. Edmunds, Suffolk.
61. Lawrence, H., 14 Edburton Avenue, Brighton.
- Tweddle, J., jun., School House, Willington, co. Durham.
- Bagnall, Miss E. A., 42 Harrington Street, Dublin.
- Hampshire, C. W., Parson Cross Road, Wadsley Bridge, Sheffield.
64. Quatrough, J. P., Alexandra Road, Castletown, Isle of Man.
- Raybon, A., 120 Malvern Street, Stapenhill, Burton-on-Trent.
68. Davies, D. T., jun., Derlwyn, Glynllwchwr Road, Pontardulais.
- Britton, R., 10 Richmond Villas, Ilfracombe, Devon.
- Davies, W., 2 Watergate, Brecon, South Wales.
- Jones, W. P., The Meadows, Coed Talon, nr. Mold, North Wales.
69. Kelly, W. E., The Schoolhouse, Andreas, Isle of Man.
- Knight, R. J., School House, Ditcheat, nr. Evercreech, Som.
- Prime, Miss K. E., Wingfield School, Harleston, Norfolk.
- Westlake, S. G., 2 West View, Fordton, Crediton, Devon.
- Finney, R. R., 2 Nut Street, Thatto Heath, St. Helens, Lanes.
- Jones, T., 21 Maesteg Road, Maesteg, Glam.
76. Peake, F. S., 80 Tunstall Road, Biddulph, Congleton.
- Stowell, P. L., The Parade, Castletown, Isle of Man.
- Turner, J., Wesleyan School, Crawshawbooth, *via* Manchester.
- Wake, H. H., 1 Hilda Road, East Ham, E. 6.
- Jones, J. R., 32 Kensington Avenue, Manor Park, E. 12.
82. King, J. T., Bramley House, Ashcott, nr. Bridgwater.
- Worthy, W. H., 1 Plym Villas, Plymstock, nr. Plymouth.

Third Class.

- Jones, W. J., 177 Upperthorpe, Sheffield.
- Harris, H. J., Swingfield School, nr. Dover.
1. Law, Miss A. W., 7 St. Paul's Square, Holgate Road, York.
- Sheppard, Miss E., 4 Greenbank Villas, Barcot Road, Wells, Som.
- Allpress, A. K., 31 Holdenby Road, Crofton Park, S.E. 4.
- Brimson, Miss E., Banchory, Macdonald Avenue, Westcliff-on-Sea.
- Done, A., 139 Houghton Road, Hetton-le-Hole, Durham.
5. Eyles, W. J., 117 Loyd Road, Northampton.
- Gwynne, D. B., School House, Llanrhian, Letterston, Pem.
- Short, A. B., St. Andrews, Westbury, Sherborne, Dorset.
- Hall, J. M., Kimblesworth Cl. School, co. Durham.
11. Rigby, G. H., The School House, Dalham, nr. Newmarket, Suffolk.
- Bragg, A. T. W., 34 Finedon Road, Irthingborough, Wellingborough.
- Cooke, Miss D. A., Girls' School, New Brancepeth, Durham.
- Jones, J. W., Brynawel, Croesgoch, Letterston, Pemb.
13. Mountford, H. R., 123 Newtown Road, Bedworth, nr. Nuneaton.
- Rotherham, J., 8 Prospect Terrace, Neville's Cross, Durham.
- Williams, T., Glen Cottage, Darran Road, Mountain Ash.
- Woods, H. G., 17 Union Road, Above Hill, Lincoln.
- Hawkes, C. W., 9 Clarence Place, Kingsdown, Bristol.
20. Furniss, Miss L., 531 Chatsworth Road, Chesterfield.
- Ward, G. D., 4 Wellington Terrace, Birnbeck Road, Weston-s.-Mare.
- Corfe, Miss M. E. E., 627 Seven Sisters Road, S. Tottenham, N. 15.
- Mallows, G. A., 33 Harpenden Road, Manor Park, E. 12.
- Marriott, J. H., 56 Glasgow Street, Northampton.
23. Milne, H., School House, Sand Hutton, York.
- Sladen, C., Bardwell School, Bury St. Edmunds.
- Waterhouse, T. N., Newholme, 104 Church Road, New Mills, Stockport.

- Barrett, G. H., Hortonville, Millfield Lane, Hull Road, York.
 Brindley, C. W., Moorbrook, Bradwell, *via* Sheffield.
 Ellman, H. S., Oakhill Farm, Horsham, Sussex.
 Gell, Miss M. E., 73 Malew Street, Castletown, Isle of Man.
 29. Hesselgreaves, G. E., 40 Stansfield Road, Todmorden.
 Rowlands, G. W., Brighton Villa, Clevedon, Som.
 Turland, M. G., 244 St. George's Road, Coventry.
 Wiggs, L. F. L., 84 James Lane, Leyton, E. 10.
 Boot, P. E., Pevensey, Watling Street, Bridgtown, Cannock, Staffs.
 Foizey, Mrs. M. R., 56 Adelaide Street, Crawshawbooth, nr. Manchester.
 Hall, Miss D. M., Roswyn, Swanscombe, Kent.
 Hammond, F. A. C., High Street, Ixworth, Bury St. Edmunds.
 37. Herring, V. R., 10 Lancaster Road, Bowes Park, N. 11.
 Taylor, Miss M. M., Long Compton, Shipston-on-Stour, Worcs.
 Smith, H., 6 Ladbroke Road, Bush Hill Park, Enfield, Middlesex.
 Wildgoose, Miss A. E. E., West View, Hollins Road, Macclesfield.
 45. Fearn, J., 45 Darracott Road, Bournemouth.
 Smale, Miss A., 78 Mitchell Street, Newtown, Wigan, Lancs.
 Davies, E. D., 8 Turle Mansions, Tollington Park, N. 4.
 47. Harries, W. J., Bryn Villa, Llanddarog, Carmarthen.
 Goldsack, Miss E. M., Highbury, Wateringbury, Maidstone, Kent.
 49. Last, Miss H. E., Wickham Skeith, Eye, Suffolk.
 Simpson, Miss C. A., 48 Amberley Road, Bush Hill Park, Enfield.
 Baty, T., 1 Oak Cottages, Enfield Road, Old Southgate, N. 14.
 Brooks, W. J. L., 38 Bostock Avenue, Northampton.
 Craze, L., Schoolhouse, Siddington, Cirencester, Glos.
 52. Duke, Miss E. W., School House, Cusop, Hay, Brecon.
 Inwood, Miss B., 37 Seymour Street, St. Johns, S.E. 8.
 Pearce, F., 8 Osborne Avenue, Ashley Down, Bristol.
 Robinson, J. E., School House, Tibay, Westmorland.
 Shaw, G. H., 7 Dryden Street, Westcott Street, Hull, Yorks.
 Davies, J., 100 Addlecroft, Scotforth, Lancaster.
 Dear, S., 22 Grosvenor Road, Heaton Moor, Stockport.
 60. Hughes, Miss M., 25 Cadbury Road, Moseley, Birmingham.
 Lloyd, A., Daventry, Bushbury Road, Fallings Park, Wolverhampton.
 Bott, Miss A. J., Brookside, Newark Road, N. Hykeham, Lincoln.
 Curry, Miss A. E., Beach Road, Dovercourt Bay, Essex.
 Dexter, W. E., 7 Broomwood Villas, The Bourne, Farnham, Surrey.
 Dolman, W. J., Church of England School, Buckingham.
 64. Peat, Miss D. M., 28 Effingham Road, Reigate, Surrey.
 Sainsbury, A., Walsworth, Albany Road, Salisbury.
 Salter, Wm. J., Brynteg, St. Stephen's Avenue, Pentre, Rhondda.
 Shenton, F. G., 31 Station Road, Meir, Stoke-on-Trent, Staffs.
 Tootell, Miss F., St. Juliot School House, Boscastle, Cornwall.
 Baker, Miss D. K., 37 Auckland Road, Tunbridge Wells, Kent.
 Hardy, C. E., Winston-on-Tees, Darlington.
 73. Oakley, Miss E. A., 9 Bell Street, Reigate.
 Webb, T. W., 25 Mansfield Road, Hasland, Chesterfield.
 Everingham, J. B., 26 Berkshire Road, Bishopston, Bristol.
 Mason, P. A., 204 Alcester Road, King's Heath, Birmingham.
 77. Rofe, A. J., 166 Sandhurst Road, Catford, S.E. 6.
 Scott, T. R., 42 Louise Street, Burslem, Stoke-on-Trent.
 Sheffield, L. W., 18 Wellington Road, Raunds, Wellingborough.
 Fleet, Miss D. E., 26 Eastwood Road, Goodmayes, Essex.
 82. Hampson, Miss A., 904 Park Lane, Bryn, Wigan.
 Neale, W. R., 54 Queen Street, Castlefields, Shrewsbury.
 Smith, Miss A. C., 6 Ladbroke Road, Bush Hill Park, Enfield, Middlesex.
 Dunk, Miss S. M., Awre Vicarage, Newnham, Glos.
 Ewing, W. P., 14 Brighton Avenue, Burnage Lane, Levenshulme, Man.
 Fuge, W. E., School House, Gillingham, Dorset.
 Harris, Miss A. F., 53 Wimbledon Park Road, S.W. 18.
 86. Leneham, J. C., 12 Union Street, Long Eaton, Notts.
 Littlewood, Miss E., Rookery, Bridgemont, Whaley Br., nr. Stockport.
 Lush, M., Cloncliffe, Winchester Hill, Romsey, Hants.
 Williams, A. J., c/o Mrs. Morgan, Rose Cottage, Eglwysilan Road, Abertridwr, Cardiff.
 Davies, D., 5 Hill Street, Hendreforgan, Giffach Goch, nr. Bridgend.
 94. Norman, Mrs. A. B., Harton, Barton-le-Willows, York.
 Richens, F., 7 Brook Street, Woodbridge, Suffolk.
 Stonebridge, Miss L., East View, Burnt Oak, Edgware.

- Pinshing, Miss O., The Cottage, Hasketon, Woodbridge, Suffolk.
98. { Quinn, Miss J., 11 The Avenue, Durham Road, Leadgate, co. Durham.
Southon, H. E., 153 Staines Road, Hounslow, Middlesex.
Atkinson, Miss M., 193 Longwood Road, Longwood, Huddersfield.
101. { Deeprose, C., 85 Milson Road, West Kensington Park, W. 14.
Dyer, H., 70 Headcorn Road, Thornton Heath, Surrey.
Stone, B., 17 Clarence Street, Egham, Surrey.
Bannister, A. J., 92 Venner Road, Sydenham, S.E. 26.
Harvey, A., 43 Fife Street, Crewton, Derby.
105. { Margaret, Sister Mary, St. Wilfrid's Convent, Cale St., Chelsea, S.W. 3;
Montgomery, W. J., Adfa, Newtown, North Wales.
Norris, H. S., 64 Norfolk Road, Erdington, nr. Birmingham.
Pyke, G. F., 2 West Villas, West Street, Newbury, Berks.
111. { Fraser, Miss K., 20 Brackley Road, Heaton Chapel, nr. Stockport,
Phillips, R. E. R., Chevithorne, Tiverton, North Devon.
Talbot, E. W., School House, Hingham, Attleboro, Norfolk.
Box, J. W., School House, Gt. Sankey, Warrington.
Owen, Miss I. L., 514 Stapleton Road, Eastville, Bristol.
Pickles, H., Gazeley, Newmarket.
114. { Pillar, Miss E. M., 118 Ramsden Road, Balham, S.W. 12.
Probert, Miss L., Littley Nurseries, Hereford.
Roberts, E., Llys Trebor, Cefn Road, Old Colwyn.
Walker, R. J., 4 West View, Seaford, Sussex.
121. { Cricks, Miss M. A., 333 Wanstead Park Road, Ilford.
Hartland, D. H., 187 Turl's Hill Road, Hurst Hill, nr. Bilston.
Hulland, G. B., 18 Luke Street, Bampton, Devon.
Beard, W. H., Trafalgar House, Stanley Road, Ashford, Middlesex.
Beaton, J. L. R., Belville House, High Street, March, Cambs.
124. { Clegg, H., 59 Anderson Road, Erdington, nr. Birmingham.
Dale, Miss J. B., 3 Hopwood Gardens, Tunbridge Wells.
Hudson, W. L., 25 Glenwood Avenue, Westcliff-on-Sea, Essex.
Pringle, Mrs. E., 41 Howard Street, Sutton-in-Ashfield, Notts.
Stevenson, Miss E., 3 St. James' Avenue, Brightmet, Bolton.
132. { Wilder, Miss B., School House, West Clandon, Guildford, Surrey.
Chappell, W. H., 715 Washwood Heath Road, Birmingham.
Davies, Ll. M., 26 Ffordd Estyn, Garden Village, Wrexham, N. Wales.
Anstis, R., 26 Lewis Street, Great Bridge, Tipton, Staffs.
134. { Barrett, R. L., The School House, Rawnsley, Hednesford, Staffs.
Cook, W., 285 Manchester Road, Blackrod, nr. Chorley, Lancs.
Cowen, T. E., Beech Cottage, Stoney Middleton, Sheffield.
Hatton, E. W., Cot Lane, Kingswinford, nr. Dudley.
Johnson, D. L., St. David's C. School, Llandyssul, S.O., S. Wales.
147. { Jutsum, T. W., Ifield School, near Crawley, Sussex.
Moore, F. W., Westbury House, Old Church Road, Clevedon, Som.
Olpin, G. M., The Cypresses, Foxmoor Lane, Ebley, Stroud, Glos.
Stobie, J. S., Grasmead, Hebron Road, Linthorpe, Middlesbrough.
Prior, Miss F. A., Roseheath, Swanley Village, Kent.
144. { Votrey, Miss F. G., Enderly, The Fields, Alsager, Stoke-on-Trent.
Whitworth, A., 56 Beaconsfield Street, Hyson Green, Nottingham.
Bostock, T., Burton School, Neston, Chester.
Cullum, F. J., Kelsey Cottage, Patrick's Road, Dovercourt.
147. { Edgar, Miss F., 1 Wensleydale Terrace, Gateshead.
Parry, G. H., 9 Rose Hill, Holywell, Flints.
Rees, E. A., School House, Bucknall, nr. Lincoln.
155. { Weaver, B., 20 Milton Road, Sneyd Green, Hanley, Stoke-on-Trent.
Wise, E. G., 38 Redcross Street, Grantham, Lincs.
Wisken, Miss B. E., Ivy Cottage, 14 Trinity Street, Bungay, Suffolk.
Clarke, F., Park View, Bath Road, Frome, Som.
155. { Evans, T. G., Bryn Awelon, Moorland Road, Bargoed, Glam.
Fowler, T. J., 14 Manor Square, Otley, Yorks.



ROYAL HORTICULTURAL SOCIETY,

VINCENT SQUARE, WESTMINSTER, S.W. 1.

NOTICES TO FELLOWS.

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1. IMPORTANT NOTICES.

1. The Society's Hall in Vincent Square being now vacated by the Australian Imperial Force, the Fortnightly Meetings will be held in the Society's own Hall, in Vincent Square.

2. SUBSCRIPTIONS.

All annual subscriptions are payable in advance on the 1st day of January in each year. A Fellow, if elected before the 1st of July, pays the annual subscription for the current year; if elected after the 1st of July and before the 1st of October, he pays half a year's subscription; if elected after the 1st of October and before the 1st of January, he pays one full year's subscription, and no further subscription until the following January twelvemonth. To avoid the inconvenience of remembering their subscriptions, Fellows can *compound* by the payment of one lump sum in lieu of all further annual payments; or they can, by applying to the Society, obtain a form of instruction to their bankers to pay for them every January 1. It may be a week or more before the Tickets reach the Fellows, owing to the very large number (over 20,000) to be despatched every January. Fellows who have not already given an order on their bankers for the payment of their subscriptions are requested to do so, as this method of

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payment saves the Fellows considerable trouble. Fellows whose subscriptions remain unpaid are debarred from all the privileges of the Society; but their subscriptions are nevertheless recoverable at law, the Society being incorporated by Royal Charter.

In paying their subscriptions, Fellows often make the mistake of drawing their cheques for Pounds instead of for Guineas. Kindly note that in all cases it is Guineas, and not Pounds. Cheques and Postal Orders should be made payable to "The Royal Horticultural Society," and crossed "London County and Westminster Bank, Victoria Branch, S.W. 1."

[3. FORM OF BEQUEST.

I give and bequeath to the Treasurer for the time being of the Royal Horticultural Society, London, the sum of £ to be paid out of such part of my personal estate as I can lawfully charge with the payment of such legacy, and to be paid free of legacy duty within six months of my decease; the receipt of such Treasurer to be a sufficient discharge for the same. And I declare that the said legacy shall be applied towards [the general purposes of the Society].*

4. NEW FELLOWS.

The President and Council hope that existing Fellows will enlist the sympathy of all their friends, as, owing to the great increase in work which has fallen upon, or been voluntarily undertaken by, the Society, it is now more important than ever to fill the places of those who are taken from us. The annual revenue of the Society is nearly £10,000 less to-day than it was five years ago, and if the work is to be carried on successfully it is most important that this loss should be made good without delay.

5. AN APPEAL.

What has been accomplished for the Society is largely due to the unwearied assistance afforded by the Fellows themselves, and as all belong to the same Society, so it behoves each one to do what he or she can to further its interests, especially by:—

1. Increasing the Number of Fellows.
2. Presenting Books for the Library at Vincent Square and at Wisley.
3. Sending new or rare Plants, Seeds, and Roots for the Garden and for distribution to Fellows.

6. THE SOCIETY'S GARDENS AT WISLEY.

The Gardens are open daily to Fellows and others showing Fellows' Transferable Tickets, from 9 A.M. till 6 P.M., except on Sundays, Good Friday, Christmas Day, and Meeting Days. Each Fellow's Ticket admits three to the Gardens. The Public are not admitted at any time.

The Gardens are about 3½ miles from Byfleet, 3½ miles from Horsley, and 5½ miles from Weybridge, all on the South-Western Railway. Carriages to convey four persons can be obtained by writing to Mr. D. White, fly proprietor, Ripley, Surrey; or motor cars can be had at Byfleet Station by applying to Mr. Howard, the Garage, Byfleet, Surrey. Accommodation and refreshments can be had at the Hut Hotel close to the Gardens, and also at the Hautboy, Ockham.

All communications to the Gardens should be addressed to "The Director" R.H.S. Gardens, Wisley, Ripley, Surrey.

* Any special directions or conditions which the testator may wish to be attached to the bequest may be substituted for the words in brackets.

The attention of Fellows is specially called to the Wisley Gardens Endowment Trust Fund, the object of which is to make the Gardens self-supporting for ever, so that the important work to which they are devoted may go on uninterrupted by any fluctuation in the Society's finances. To do this at least £100,000 is required. In 1914 the Council voted £25,000 towards it as a nucleus. Will not Fellows help to complete this sum?

7. STUDENTS AT WISLEY.

The Society admits young men, between the ages of sixteen and twenty-two years, to study Gardening at Wisley. The curriculum includes not only practical garden work in all the main branches of Gardening, but also Lectures, Demonstrations, and Horticultural Science in the Laboratory, whereby a practical knowledge of Garden Chemistry, Biology, &c., may be obtained.

8. DISTRIBUTION OF SURPLUS PLANTS.

Some years ago the Council drew attention to the way in which the annual distribution of surplus plants has arisen. • In a large garden there must always be a great deal of surplus stock, which must either be given away or go to the waste-heap. A few Fellows, noticing this, asked for plants which would otherwise be discarded; and they valued what was so obtained. Others hearing of it asked for a share, until the Council felt they must either systematize this haphazard distribution or else put a stop to it altogether. To take the latter step seemed undesirable. Why should not such Fellows have them as cared to receive those surplus plants? It was, therefore, decided to keep all plants till the early spring, and then give all Fellows who had paid the current year's subscriptions the option of claiming a share of them by Ballot.

Fellows are, therefore, particularly requested to notice that only waste and surplus plants raised from seeds or cuttings are available for distribution. Many of them may be of very little intrinsic value, and it is only to avoid their being absolutely wasted that the distribution is permitted. The great majority also are, of necessity, *very small*, and may require careful treatment for a time.

Fellows are particularly requested to note that a Form of Application and list to choose from of the plants available for distribution is sent in January *every year* to every Fellow, enclosed in the "Report of the Council." To avoid all possibility of favour, all application lists are kept until the last day of February, when they are all thrown into a Ballot; and as the lists are drawn out, so is the order of their execution, the plants being despatched as quickly as possible after March 1.

Of some of the varieties enumerated the stock is small, perhaps not more than twenty-five or fifty plants being available. It is, therefore, obvious that when the Ballot is kind to any Fellow he will receive the majority of the plants he has selected, but when the Ballot has given him an unfavourable place he may find the stock of almost all the plants he has chosen exhausted. A little consideration would show that all Fellows cannot be first, and some must be last, in the Ballot. Application forms received after March 1 and before April 30 are kept till all those previously received have been dealt with, and are then balloted in a similar way. Fellows having omitted to return their application form before April 30 must be content to wait till the next year's distribution. The work of the Garden cannot be disorganized by the sending out of plants at any later time in the year. All Fellows who have paid the current year's subscription can participate in the annual distribution *following* their election.

The Society does not pay the cost of packing and carriage. Owing to the railways declining to deliver these parcels any longer, they *must* now be sent by post, the postage being prepaid by Fellows. Directions as to the amount of the remittance to be sent will be found on the application form for plants, which kindly consult before sending it in.

Parcels will be addressed exactly as given by each Fellow on the address label accompanying his application form.

Fellows residing beyond a radius of thirty-five miles from London are permitted to choose double the number of plants to which they are otherwise entitled.

Plants cannot be sent to Fellows residing outside the United Kingdom.

No plants will be sent to Fellows whose subscriptions are in arrear, or who do not fill up their forms properly.

9. A NATIONAL DIPLOMA IN HORTICULTURE.

Most gardeners have welcomed the initiation by the Society of a scheme whereby a National Diploma in Horticulture may be gained by those who pass the Preliminary and Final Examinations. The Diploma is thoroughly "National,"

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for, by the consent of H.M. Government, the Department of Agriculture consented to co-operate with the Society if the Society would undertake the work of organizing the Examinations, and authorized the Diploma bearing the following words: "Awarded by the Royal Horticultural Society under a scheme approved by the Board of Agriculture."

The dates of the 1920 Examinations will be announced later. They will include practical, viva voce, and written parts; the practical part will be held in a suitable garden.

Information may be obtained by sending a directed envelope, stamped, to the Secretary, Royal Horticultural Society, Vincent Square, S.W. 1.

10. EXAMINATIONS, 1920.

The revised syllabus of the different examinations can be obtained from the Society's Office, Vincent Square, S.W. 1, post free for 1½d.

11. INFORMATION.

Fellows may obtain information and advice from the Society as to the names of flowers and fruits, on points of practice, insect and fungus attacks, and other questions, by applying to the Secretary, R.H.S., Vincent Square, Westminster, S.W. 1.* Where at all practicable it is particularly requested that letters and specimens may be timed to reach Vincent Square by the first post on the mornings of the fortnightly Meetings, so as to be laid before the Scientific or other Committees at once.

12. INSPECTION OF FELLOWS' GARDENS.

The Inspection of Gardens belonging to Fellows is conducted by a thoroughly competent Inspector from the Society, who reports and advises at the following cost, viz.: a fee of £3 3s. for one day (or £5 5s. for two consecutive days), together with all out-of-pocket expenses. No inspection may occupy more than two days, save by special arrangement. Fellows wishing for the services of an Inspector are requested to give at least a week's notice and choice of two or three days, and to indicate the most convenient railway station and its distance from their Gardens. Gardens can only be inspected at the *written* request of the owner.

13. AFFILIATION OF LOCAL SOCIETIES.

One of the most successful of the many branches of the Society's work is the affiliation of local Horticultural Societies to the R.H.S.

The list of benefits offered to Affiliated Societies has been revised and extended. It is hoped that all Societies will by Affiliation become united with the parent Society and through it with each other. Such a unity cannot fail to be attended with good and progressive results.

14. R.H.S. GARDENERS' DIARY.

The R.H.S. Gardeners' Diary for 1920 contains a considerable quantity of new information and is compiled more especially for the single-handed gardener. Fellows may obtain it from the R.H.S. Office, Vincent Square, London, S.W. 1; bound in imitation leather, 2s. over the counter, 2s. 3d. post free.

15. RULES FOR JUDGING—1914 CODE.

The "Rules for Judging, with Suggestions to Schedule Makers and Exhibitors," have been revised. Secretaries of Local Societies are advised to obtain a fresh copy. It will be sent post free on receipt of a postal order for 1s. 9d., addressed to the Secretary, Royal Horticultural Society, Vincent Square, Westminster, S.W. 1.

* See R.H.S. Gardeners' Diary—"How to send Specimens for Identification."

16. R.H.S. PUBLICATIONS FOR THE ASSISTANCE OF COTTAGE AND ALLOTMENT GARDEN SOCIETIES.

To assist Allotment Holders and Cottage Gardeners the Society has published the following, to be obtained post-free from the Secretary at the price offered :—

	s. d.
Rules and Regulations for Allotment Societies	2
Rules for Judging Cottage and Allotment Gardens	2
Companion Judges Sheet for ditto	3
Rules for Allotment and Vegetable Exhibitions	2
Vegetable Bottling and Fruit Preserving without Sugar, by Mr. and Mrs. Banks (including valuable recipes for Jams and Jellies)	1 8

Printed lectures, illustrated with lantern slides, have been prepared for the use of Societies of Allotment Holders. For particulars apply to the Secretary, R.H.S., Vincent Square, S.W. 1.

17. R.H.S. POPULAR PRACTICAL PAMPHLETS.

The following pamphlets can be ordered from the Royal Horticultural Society, Vincent Square, London, S.W. 1. They will be found eminently practical. The increase in the cost of paper and printing has necessitated revision of the price of these Pamphlets, which until further notice will be 6d. each, or by post 7d.

FOOD PAMPHLETS :—

- (e) Vegetables and How to Grow Them.
- (f) Vegetables from Seed sown in July and August.
- (g) The Cultivation and Manuring of the Garden.
- (r) Potatoes in Gardens and Allotments.
- (w) Potato Growing—Spring work.
- (x) Potato Growing—Autumn work.
- (y) Potato Growing, Some Experiments in.
- (v) Cropping Allotments and Small Gardens.
- (a) List of Hardy Fruits, with Cultivation.
- (c) The Pruning of Fruit Trees.
- (b) The Training of Fruit Trees.
- (d) Keeping Fruit Trees Clean.
- (h) Fruit and Vegetable Bottling and Storing.
- (m) Vegetable Cookery.
- (n) Salads and Salad Making.

OTHER GARDEN PAMPHLETS :—

- (g) The Herbaceous Garden.
- (h) The Rose Garden.
- (i) Flowers for Small Gardens, Window Boxes, &c.
- (j) Hardy and Half-Hardy Annuals in the Open Air.
- (o) War-time Economy in Gardening.
- (p) Medicinal Plants and their Cultivation.
- (s) Fruit Cultivation under Glass.
- (t) The Pruning of Hardy Shrubs.
- (u) The Children's Garden.

18. THE MOST DESIRABLE VARIETIES OF FRUIT.

DRAWN UP BY THE FRUIT COMMITTEE (Price 2s. post free).

Contains nearly 200 pages, and besides the list drawn up by the Committee gives lists of varieties recommended by nearly 100 expert growers all over the country for their respective parts of Great Britain. It shows the result of a ballot of varieties to be preferred for such characters as vigour of constitution, and for various purposes, as, *e.g.*, in the case of Apples—Bush, Standard, Espalier; Pears—Bush, Standard, Espalier, Wall. It also shows the best varieties for cooking as distinct from dessert, the best for markets, and much similar detail of great value now that the desirability of planting more fruits is so widely recognized.

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19. FREE LEAFLETS.

The following leaflets may be had free on receipt of a $\frac{1}{2}$ d. stamped addressed envelope; or at the rate of 2s. a hundred.

(1) Fruit Bottling for Cottagers; (2) Lady Carbery's Recipe for Preserving Fruits; (3) R.H.S. Dutch Brown Beans; (4) The Cultivation of Beans for Winter Consumption; (5) Butterfly Competitions.

20. BOOK ON FRUIT AND VEGETABLE BOTTLING.

Mr. and Mrs. Vincent Banks, in whose lectures at the Fortnightly Meetings, on Fruit and Vegetable Bottling, Fellows have shown great interest, have now prepared a book on the subject, and the Council have published it. It contains the most up-to-date practical information on the subject. It deals not only with the Bottling of both Fruits and Vegetables, but also with the making of Jam, and the pulping of Fruit to be made into Jam later on, when sugar supplies are more abundant. There are also many useful household recipes, and all the information given is the result of the actual experience of the authors extending over many years. The 1918 revised edition, which may be obtained from the R.H.S., Vincent Square, London, S.W. 1, is 1s. 6d. over the counter, or post free 1s. 8d.; bound in stiff paper covers.

21. R.H.S. WAR RELIEF FUND.

The work of the Society having greatly increased since the outbreak of the War and the staff having greatly diminished, the Council found that the management of this Fund imposed a demand upon the staff which it was impossible to meet. A special Administrative Committee for the War Relief Fund was, therefore, appointed. The Committee is composed of Members of the Council, and of the Ladies' Executive Committee which has done such admirable work in collecting money for the Fund. The Office of the Fund is at 17 Victoria Street, Westminster, S.W. 1, where all communications and donations should be addressed.

22. GARDEN CHARTS.

The Society is preparing a series of large garden charts. The following are now ready, and can be had from the Society's Office, Vincent Square, Westminster, price 3s. 6d. each, viz. :—

INSECTS.—Chart (5) American Blight. (6) Magpie Moth. (8) Destructive Caterpillars. (13) Big Bud on Black Currant. (14) Mussel Scale. (15) Apple Saw-fly. (16) Lackey Moth.

FUNGUS PESTS.—Chart (1) Apple and Pear Scab. (3) Brown Rot. (8) Potato-tuber Diseases. (9) Silver Leaf.

DIGGING.—Chart (1) Double Digging.

VEGETABLE GROWING.—Chart (1) Preparing the Ground. (2) & (3) Seed Sowing. (4) Onion Growing. (5) Cabbage Planting. (6) Celery Growing. (7) Staking. (8) & (9) Potato Growing.

STORING.—Chart (1) Potato, &c., Clamping.

